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THE

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NATIONAL ELECTRICITY SUPPLY.

ELSEWHERE in this issue we give an abstract of the report of the Board of Trade Committee on Electric Power Supply—a document of the first importance to all branches of the electrical industry, and, indeed, to almost every industry that is carried on in this country. It marks an epoch in the history of electricity supply in the United Kingdom, and if speedily acted upon—as we hope it will be—it will exercise an immense influence upon the future of that industry.

The general tendency of the Report was closely foreshadowed in the conclusions put forward by the Committee in May last year, on the basis of the reports of the Coal Conservation Sub-Committee of the Reconstruction Committee and the Electrical Trades Committee of the Board of Trade. The Electric Power Supply Committee then unanimously recognised the importance of reducing manufacturing costs to meet international competition after the war, the urgent necessity of a cheap and universal supply of electric power for this purpose, the inefficiency and inadequacy of the existing system of supply, which could only partly be alleviated by interconnection, and finally the need of the complete reorganisation of the supply industry as soon as possible.

It is with the last of these conclusions that the present report is mainly concerned. After broadly reviewing the subject in the light of the terms of reference, and justifying the conclusions summarised above, with the help of a trenchant letter from the Electrical Trades Committee to the President of the Board of Trade (dated January 19th, 1917), in which the appointment of a Board of Commissioners with ample powers was recommended, the Committee consigns the existing system to the scrap heap as "contrary to the national interest, wasteful of fuel resources," and detrimental to industry. Far wider and longer views than have been taken in the past are recommended, and it is laid down as an axiom that, in the interests of cheapness of supply, all consumers in industrial districts "*should unite in taking their supply from a common system.*" That may be taken as the key-note of the report, and it is in perfect harmony with the cry for co-operation which is heard on every hand throughout industrial and commercial circles In future the lone hand will be out of fashion, and it will be the duty of every man to "play for his side." In many cases it will involve a wrench, if only a sentimental one; duty seldom marches hand in hand with inclination, and not only corporations and companies, but individuals also, will feel that they are called upon to sacrifice their aspirations and ideals upon the altar of national advantage. They have our sincere sympathy, though we are fully convinced that none of them will suffer in a material sense.

The first step taken by the Committee towards the fulfilment of the terms of reference, we hardly need say

is to recommend the *immediate* establishment of "one central authority to regulate generation and distribution" throughout the United Kingdom, as a matter of urgency. On this point we think there is universal agreement. We may here recall the fact that this proposal was originally put forward in a paper submitted to the Institution of Electrical Engineers by Mr. E. T. Williams, in January, 1916, as an essential part of his comprehensive scheme for the reorganisation of electricity supply in this country. While the details of the Committee's scheme differ in many respects from the original plan developed by Mr. Williams, partly, perhaps, because he prudently abstained from advocating wholesale purchase and State assistance lest his views should be regarded as visionary and impracticable (two years ago)—the fact remains that he set the ball rolling, and he should be given due credit for a feat which might well have been regarded as outside the bounds of possibility. The pioneer work of Mr. R. A. Chattock in this connection also ought not to be overlooked; in his presidential address to the I.M.E.A. in June, 1914, he enunciated the broad principles which underlie the technical recommendations of the three Committees.

The Committee recommends the appointment of five Commissioners, of whom three should give their whole time to the work, with "substantial salaries, not less than £3,000 per annum"; "engineering qualifications and business experience of the highest order" are called for, and the work falling on the Commissioners is rightly regarded as likely to be heavy. Having regard to the commercial value of "engineering qualifications and business experience *of the highest order*," and the income that their possessors can count upon in private practice, the salary named is by no means excessive; let us hope that a liberal interpretation will be placed on the words "not less than," for the duties and powers to be conferred upon these Commissioners do undoubtedly call for the appointment of the very ablest men that the country can provide.

The division of the country into districts, each controlled by a Board under the supervision of the Commissioners, follows on the lines of the Coal Conservation Committee's report, but the functions of the District Boards are more far-reaching; the recommendation that they should proceed to purchase *all* the "public utility" power stations in their areas is somewhat startling. It settles at one stroke a great many difficult problems, and the Committee is to be congratulated on the daring spirit in which it has dealt with this most important question. Private plants, it will be noted, are not to be purchased, but where new plant is installed it is to be subject to regulations to ensure that it shall fit in with the general system; the Committee clearly contemplates the supply of power at such a low price that private owners of generating plant will ultimately find it to their advantage to come on the public mains.

As regards "operation," it is left to the District Board, subject to the approval of the Commissioners, to decide whether it shall itself undertake the duties or lease the undertaking to a company. No preference for one or other of these alternatives is expressed in the Report, but an important pronouncement is made to the effect that if the former is adopted, the Board shall make no divisible profit. The same point is referred to later in connection with distribution; the majority of the Committee hold that municipal distributors should not seek to make a profit for the relief of local rates, and the minority agree that such profits should be limited to a small percentage. We have always maintained that electricity supply undertakings conducted by public bodies should not make profits, and we are g'ad to see this view endorsed by the Committee, which explicitly states that "the object to be kept in view is the cheapest possible supply of electricity for industry," which should not be hampered "by overcharging consumers of electricity for the benefit of other ratepayers." As regards the second alternative, the Committee repeatedly advocates the establishment of a community of interest between suppliers and consumers, suggesting that to this end the shareholders of the lessee company should be largely composed of the consumers in the district, and that the terms of the lease should include the regulation of profits on a sliding scale or other system. There is much to be said in favour of such a procedure, but we believe there will not be many cases where the municipal authorities, who will be strongly represented on the District Boards, will countenance the leasing of operation to a company. The North-East Coast is, of course, an exceptional case, unique of its kind in this country, and the Committee makes special reference to the low costs of supply over this wide area in support of the policy of centralisation. Provision is also made, somewhat furtively, for the continuance of supply by an undertaking which is already operating on a large scale and over a large area, a course which, no doubt, will be insisted on by such important undertakings as those of Manchester, Glasgow, Birmingham, &c. In our opinion, this is a policy of questionable merit; it will surely lead to controversy and wire-pulling, and if acted upon it will deprive the smaller communities adjacent to such an area of the benefits they ought to derive from their propinquity, unless, indeed, the big undertaking thus singled out is *compelled to supply the whole district*. Otherwise the absurd position in which the power companies were placed—namely, that of having powers to supply only the unprofitable areas outside the big towns—would be reconstituted, and that would be a fatal error. Suppose, for example, that Manchester Corporation is authorised to "carry on"; either it should supply the whole of the South Lancashire area, from a sufficient number of power stations, or else, if it is confined to its present area, the Board supplying the adjoining district will be in the undesirable position above mentioned.

With the constitution of the Boards and the methods of finance, both questions of the first importance, we have not space to deal on this occasion. We must, however, refer to the subject of distribution. The Committee recommends that this function should continue to be performed by the present distributors, if they so desire, and that the engineering staff of the distributors should co-operate with the engineers of the District Electricity Board, or its lessees, and says:—"The distributors must recognise that distribution is as important as generation, and requires the same skilled technical direction. *It would be a fatal policy if the distributors were to attempt to cut down their engineers' salaries, just when the new and cheaper bulk supply ought to make them busier than ever.*" (Our italics.)

We desire to emphasise this passage to the utmost of our power. We have dealt with the subject before on exactly the same lines, and we regard the matter as being of the first importance to the future success of the electricity supply industry, as well as to the peace of mind of the engineering staffs of existing undertakings. The prospects of the industry are almost unlimited, and, as the Committee points out, under the new *régime* there should be new and improved openings for engineers and other officials; our sympathies are with those who fear the contrary, but we are convinced that their doubts are entirely unfounded. The Committee quite rightly recommends that provision should be made for compensation for displaced officials in cases of hardship, but we believe that the demand for skilled engineers will be so pressing that their circumstances in life will be greatly and progressively improved. It will be observed that the

duties of the Commissioners, in the opinion of the Committee, "should include the *encouragement* of the supply and distribution of electricity"; as we have pointed out on previous occasions, it is useless to provide for indefinite expansion of the supply of electricity without correspondingly developing the demand, and there will be abundant scope at the distribution end of the undertaking for the exercise of engineering ability and commercial acumen.

The recommendations that the State shall assist in providing the necessary funds for new developments, that the latter shall be taken in hand immediately, that extended powers for the erection of overhead lines and for compulsory wayleaves should be conferred upon the Commissioners, that rating reforms shall be put in hand, and that water-rights for condensing purposes shall be secured, are all of the greatest importance, and we hope they will soon be embodied in an Act of Parliament; but the discussion of these and other matters must be deferred. For the moment we can only add a comment on an aspect of the subject which ought always to be kept in view as a matter of the first importance—the saving of fuel which can be counted upon to accompany the development of the scheme, and which is, indeed, one of its principal objects. Concurrently with economy in the generation of electricity there will come economies due to the abolition of small power plants, to the development of electric lighting, cooking, and heating, and to the electrification of railways, resulting in an aggregate saving which, we believe, when the new system is in full operation, will easily repay the whole of the additional capital outlay in a single year; this consideration alone would amply justify the recommendation of the Committee that the Government should not wait until prices have fallne, but should push on with the work of reorganisation and new construction without delay.

The I.E.E. Meeting.

An interesting incident at the annual general meeting of the Institution, last week, was the participation of Mr. G. Semenza, who is the local hon. secretary of the I.E.E. in Italy, and stands at the head of the electrical engineering profession in that land of sunshine, water-power, and lavish hospitality. Many of the members who took part in the memorable tour of the I.E.E. in Northern Italy, in 1903, will recall with pleasure the courtesy and assistance rendered to them by Mr Semenza, an Italian born in England, who was mainly responsible for the admirable organisation of the tour, and will join with us in welcoming him to London.

Referring to the metric system, which was under discussion, Mr. Semenza pointed out that our Italian Allies were anxious that Britain should take the place of Germany in their markets, but there was a serious obstacle to the fulfilment of that wish—namely, the English system of weights and measures. The adoption of the metric system, he said, was essential to success, and he urged that this was *a matter of the highest importance*. We commend this statement to the notice of our readers; coming from an Italian engineer, who is a sincere well-wisher of this country, and intimately conversant with trading conditions in Italy, it is of exceptional significance and weight.

Practically the only criticism of the Report of the Council at the meeting was that which was directed to the rather ambiguous reference to the metric system in connection with the Engineering Standards Committee's specifications. As published in the report, it stated in a roundabout way that the standard dimensions could be stated either in inches with metric equivalents added, or in metric measures alone, or in metric measures with inch equivalents added, as desired by the manufacturing interests concerned, and we did not think worth while even to mention the matter in our abstract of the report. There is, however, one significant feature in this statement—namely, that the remaining alternative, that of stating the dimensions in inches alone, is conspicuously absent.

Export Trade Expansion Schemes.

The export trade expansion scheme advanced by Sir Charles Mandleberg, of Manchester, to which we have referred in some detail already, is making satisfactory progress. Our readers are aware that it is in no sense a specialised scheme for the trade in which they are interested, but obviously there is plenty of room for organised efforts on the part of general traders, as there is also for co-operative action among the large number of electrical firms who, either through ineligibility or indisposition, are outside the circle of what we understand as "the larger" electrical manufacturing firms. Up to the present, Sir Charles has not made any systematic effort to approach the general body of manufacturers, but he recognises what an excellent service the trade Press is able to render in making the matter known, and we believe that it is largely through such a medium that some 250 firms in various industries and in all parts of the country have associated themselves with the proposal, which, in essence, is for the establishment of a British Manufacturers' Corporation working on mutual lines with the object of placing manufacturers in a better position to extend their overseas trade after the war. A pamphlet has been issued giving the names, trades, and addresses of the firms who have entered into agreement to this end. They include a few electrical firms, and others interested in machine and engineers' tools, belting and packing, scientific instruments, elevators, vacuum cleaners, &c.—forming a not unimportant percentage of the whole. Sir Charles has not been precipitate in calling the preliminary meeting of supporters, owing to the general situation, but he is about to convene such a gathering so that a Provisional Committee may be appointed to formulate the scheme in detail. He invites manufacturers who are interested to communicate with him at once at Albion Works, Pendleton, Manchester. Firms who have not already made their export trade expansion plans, or are desirous of supplementing arrangements already entered into, should study our previous references to the proposal (Electrical Review, December 14th, 1917, February 8th, 1918), and, if necessary, apply to the promoter for further particulars.

Employment for Disabled Men.

One of the most important war problems before the country, both from the humanitarian and from the industrial point of view, is that of finding suitable employment for the sailors and soldiers who, in fighting our battles, have suffered bodily injuries which result in their partial disablement. Excellent work has been done by the Institution of Electrical Engineers, both in London and in some of the provincial centres, towards training disabled men in electrical work, and the Ministry of Pensions has made arrangements for the same purpose, with gratifying results. From time to time we have published articles dealing with the subject, and in this issue we give some particulars based upon the actual experience of a central station engineer, which indicate various classes of work for which certain kinds of disablement render a man unsuitable. Information of this kind is very useful, and as experience accumulates much more will become available. We trust that engineers employing disabled men will, for the sake of those who are yet to come, keep us informed as to any new openings that may be found for them, and give them the benefit of their experience. We may point out that it is not only in electricity supply that disabled men can be efficiently employed; in many manufacturing processes blind men, and deaf men, may be as useful as those who possess all their faculties unimpaired, and we owe it to them as a sacred duty to exert ourselves on their behalf.

DISABLED SOLDIERS AND THEIR EMPLOYMENT.

BY "RESEARCH."

UNTIL the war is over, a discharged soldier may be considered as a disabled soldier. The disablement may not be visible, but it prevents him being of use for active service, and also prevents him from taking strenuous jobs in civil life. Many of these men will have to find other work to do, and there are many jobs in the electrical supply business that they may become proficient at. After the war business will be more strenuous than in the past, if this country is to keep its place in the sun. Every man that can work must do so. The electrical supply business cannot find any place for men suffering from the following disablements: loss of both eyes, total loss of hearing, bad shell shock, loss of both legs, or very defective heart. Their lot must be made as happy as possible, and some of them may find light, special jobs to occupy them.

Employers and men are up against difficulties which must be overcome. Men are given jobs to do in which their disablement is eventually found to be a serious drawback. This is bad for all parties. The employer's enthusiasm in engaging disabled soldiers may be damped considerably, the man engaged feels the position keenly as his disablement is rubbed in, and much time spent in special training is wasted. Let us, therefore, consider the various positions and the disablement that disqualifies a man for a particular position :—

Position.	Disqualifying disablement.
1. Switchboard attendant.	Shell shock (steady nerves required).
	Heart bad (danger of electrical shock).
2. Sub-station attendant.	Loss of arm (cannot work regulator handles).
3. Air compressor or hydraulic plant attendant.	Loss of leg (cannot get about quickly when there is a breakdown).
4. Battery attendant.	Loss of hearing (cannot detect things starting to go wrong by sound).
	Loss of smell (cannot smell machines or cables getting hot).
5. Engine driver.	Heart bad (hard work required).
6. Greaser.	Loss of arm (cannot work regulators, &c.).
7. Stoker.	Loss of leg (cannot get about quick enough).
8. Meter or instrument repairer.	Loss of arm (full complement of fingers required).
9. Armature & coil winder.	Loss of eye (good eyesight required, and must be able to judge distances accurately).
10. Telephone work.	Loss of arm (both hands required).
11. Bell work.	Loss of hearing.
12. Signalling devices.	
13. Meter inspector.	Loss of leg, hearing, or eye.
14. Motor inspector.	Loss of leg, hearing, smell.
15. Motor repairer.	Loss of leg or arm, hearing, smell, bad heart.
16. Installation inspector.	Loss of leg, hearing, arm.
17. Installation complaints.	Loss of leg, arm, hearing, smell, bad heart.
18. Heater and cooker inspector.	Loss of leg, arm, hearing, smell.
19. Heater and cooker repairer.	Loss of arm, hearing, smell.
20. Mains fuse inspecting.	Loss of leg, arm, smell, bad heart.
21. Mains records.	Loss of arm, eye.
22. Meter tester.	Loss of arm, eye, hearing, smell.
23. Coal, water, and oil tester.	Loss of arm, hearing, smell.
24. Gateman.	Loss of hearing, arm.
25. Timekeeper.	
26. Clerical work.	

For the teaching and instructing of these men the ordinary routine is unsuitable. The aim of the ordinary technical class is to give a boy a varied electrical education extending over three to six years, which fits him for any branch of the electrical business. A man changing his business later on in life cannot spare all this time, and cannot expect to become proficient all round. He wants help to show him what branch of the business he will stand the most chance of becoming efficient at, and then special coaching in that branch of a very practical character. Long holiday periods must be cut out. Boys and men should not be taught together, as the man has forgotten much of what he learnt at school, and would not care to expose his ignorance before boys. The passing of examinations, whilst desirable, should not be pressed, as this may frighten some away from the classes.

The first three or six months might be spent in teaching elementary electricity and magnetism, with frequent visits to various works to enable the disabled soldier to see for himself the different branches and decide which one is the best for him. He should then receive special instruction in the branch he has chosen.

Studying the table of positions possible, it will be seen that they may be divided into four classes. Positions numbered 5, 6, 7, 24, 25, 26 do not require technical education. Of the remaining three classes, the first might comprise positions 1, 2, 3, and 4. The men choosing these positions would be on shift work, and special arrangements, if possible, should be made for the men missing one week out of three without losing touch with the lessons.

The next class might be called the inspectors' class, and comprise 10, 11, 12, 13, 14, 16, 18, 20, 21, 22. A knowledge of testing and what constitutes defects in apparatus would be necessary.

The final class would contain the repairers, positions 8, 9, 10, 11, 12, 15, 17, 19. A knowledge of testing and of the construction of apparatus is necessary for this, besides, of course, some mechanical skill.

Some suitable rules for the employment of disabled soldiers are necessary :—

1. Original employés now serving in the Army to have first claim to the most suitable job when they return. Disabled soldiers taken on must, if requested, obtain a position elsewhere to make room for the original employé. The employer could promise to give one to three months' notice to allow sufficient time to obtain another position.

2. The expense of prolonged stopping off duty through illness, probably necessitated by their injuries received whilst in the Army, not to be borne wholly by the employer, but should be provided for by the Government.

3. In learning a new job, small pay to be given for a short period and then full ordinary pay if evidence is shown by attending classes or studying that an earnest attempt is being made to become proficient.

The disabled soldier should take into consideration the following facts :—That as regards pay, if he is able to undertake the work of a fully qualified man, he is entitled to the full rate of pay. If, through lack of training or physical infirmity, he can only take the place of a woman or boy, he must be satisfied with a less pay. That bad time-keeping, from whatever cause, either prevents a person's employment, or two persons must be employed to do one person's work. That if time is spent in training a person in a new job the employer is entitled to that person's services, when efficient, for a little time afterwards at least. The employer, on his part, must remember that special patience must be shown and allowance made for these men who have passed through experiences such as never occurred before, and have sacrificed themselves for the safety, honour, and welfare of their country.

SOME INTERESTING FACTS RELATING TO LAMP RENEWALS.

BY "ATLANTIC."

CASES come to the attention of all electrical contractors and others employing and installing lamps where apparently, for some undiscoverable reason, lighting installations show for some time a considerable number of burn-outs calling for a rate of renewal which is higher than normal. This higher rate of burn-outs and replacement quite frequently leads to dissatisfaction with lamps, and complaints as to their quality, and the tendency of the user is to lay the blame upon the lamps.

The following account of how lamp failures occur, with an explanation of the apparently high rate on new installations, may be of considerable value in showing that these variations in burning-outs and renewals of lamps are not necessarily due to poor lamp quality.

In a new installation it is quite generally found in service experience that for a long time after the lamps have been installed there is a variation or fluctuation in the rate of lamp burn-outs. This range of variation becomes less with the time of burning, until the rate of burn-outs and renewals finally becomes constant. Now, this variation, which is often attributed to inferior lamp quality, is shown by the following analysis to result from the burn-out characteristics of incandescent lamps.

Take, for instance, an installation in which all the lamps are new. During the first two or three hours of service a small percentage of the lamps will burn out. As the period of burning approaches the rated life of the lamps—*i.e.*, 800 to 1,000 hours—the rate of burn-outs will increase. Referring to fig. 1, the solid curve, which is known as the

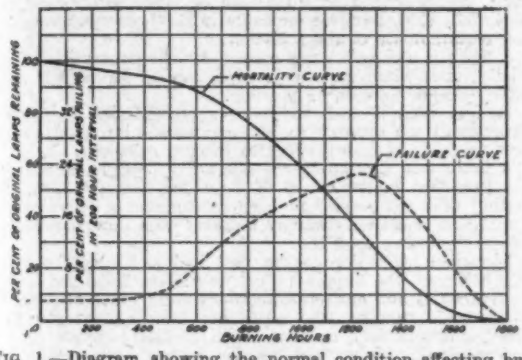

FIG. 1.—Diagram showing the normal condition affecting burn-outs of well-made incandescent lamps with an average life of about 1,000 hours. The solid line curve is the mortality or survivor curve, indicating the percentage of surviving lamps at each period of burning hours (shown on the horizontal scale). The dotted line curve is the failure curve, showing the percentage of lamps failing at each period of burning hours.

mortality or survivor curve, graphically represents the above principle. For example, for the first 200 to 300 ours of service the lamp failures, it will be noted, are comparatively few, but afterwards the rate of mortality steadily increases up to 200 to 300 hours beyond the average life (1,000) of all lamps. After this period the rate of mortality decreases continuously until the entire

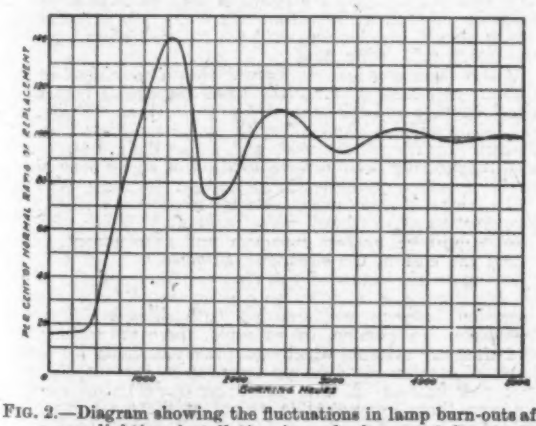

FIG. 2.—Diagram showing the fluctuations in lamp burn-outs after a new lighting installation is made, for a period up to 5,000 hours of service of the installation. This curve is plotted so as to show the percentage variation from the normal rate of burn-out which is represented by the 100 per cent. (horizontal) line. It will be seen that the rate of burn-out of lamps reaches a peak value of 140 per cent. at about 1,300 hours, and the fluctuations both above and below the normal rate of burn-out continue with the oscillations of the renewal rate curve, decreasing until they practically disappear at 4,000 to 5,000 hours of service of the installation, when the lamps settle down to the normal rate of burn-out represented by the 100 per cent. line.

number of the initial lamps has failed. The broken line curve in fig. 1 represents the variation of the *rate* of burn-outs or renewals under the conditions represented by the solid-line curve. It will be noticed that this rate gradually increases and shows a maximum or peak point just beyond the average life period of the lamp (1,000 hours)—*i.e.*, at the life period, 1,200—1,300 hours. After this point the rate of lamp breakages declines till all the lamps are burnt out.

To get the total lamp failures, we must take not only the failures of the original lamps, but the failures of the lamps replacing them, into consideration—*i.e.*, take all the failures both of new and replaced lamps. Now, if we take the normal rate of burn-outs and renewals as 100 per cent. and plot the total lamp burn-outs and renewals as a percentage of the normal rate of burn-outs, we have the curve shown in fig. 2. This curve very clearly illustrates the periodic fluctuation in the rate of lamp burn-outs. It will be seen that it starts with any new installation considered at very low percentages of the normal rate of burn-outs—*i.e.*, below 20 per cent.—and at about 400 hours the rate of burn-outs begins to grow very rapidly, rises fully to the normal rate of 100 per cent.; passes this, and goes up to 140 per cent. rate of burn-outs at about 1,400 hours. The rate of burn-out then declines to normal, and goes below normal to a 75 per cent. rate of burn-outs at about 1,750 hours. The rate of burn-out then rises again to a maximum rate of 110 per cent. of normal burn-outs at about 2,400 hours, and then the curve again declines to about 95 per cent. of normal at about 3,000 hours. As the time of burning goes on, the oscillations of this renewal rate curve show a decrease in range, and finally, at 4,000 to 5,000 hours' active use of the installation, the renewal rate, it is seen, becomes practically constant and normal.

It is thus clearly shown that for a period up to 4,000 to 5,000 hours' total use of a new lighting installation the rate of lamp renewals for certain included periods may be considerably higher than would be normally expected, and for certain other periods the rate may be lower than the normal rate. These swings in rate of burn-out tend to balance each other, so that if the full period of the use of the installation is taken the variation in the lamp burn-outs will be about the same as if the burn-out rate were normally constant from the beginning.

A study of the question by the aid of the curves is most useful, in showing that for every new installation a considerable rise in lamp burn-outs and renewals is to be expected in the first 1,200 hours' of use, and that the rate of renewal will be a maximum at between 1,000 and 1,400 hours for lamps having an average life of about 1,000 hours.

THE NEED FOR HYDRO-ELECTRIC DEVELOPMENT IN SPAIN.

[BY OUR CORRESPONDENT IN SPAIN.]

THE question of the utilisation of water power is now receiving marked attention in Spain from all quarters. It is doubtful if any other neutral country has suffered more during the war than Spain, where the appalling shortage of coal is little less than a national calamity.

Spain is dependent upon foreign supplies for about 2½ million tons of coal yearly, approximately 30 per cent. of her needs. During the past year hardly any coal from foreign sources has been available, and to shortage of foreign supply is added the prevailing lack of rolling stock and cargo boats, intensified again during the winter months (when coal is most needed) by snowstorms and delayed traffic on land and by foul weather and delayed traffic at sea.

The irony of the situation is that Spain is a country rich in water power. The hydro-electric power actually in use is not more than 250,000 KW., a little more than 8 per cent. of what it is possible to utilise on the large rivers alone. The total available water power is about 5,000,000 H.P., five times Mr. Newlands's estimate for the British Isles. It is true that the wholesale destruction of forests in past times has had a very detrimental effect upon the evenness of stream flow throughout Spain; an effect very keenly felt by Spanish agriculture at the present time, and it is becoming more clearly understood that the salvation of Spanish agri-

culture, by means of improved waterworks and irrigation, may also mean the development and salvation of Spanish manufacturies.

At the "National Congress of Irrigation," held in Seville during the second week in May, Senor Prado Palacio emphasised this point, and made an earnest appeal that hydro-electric development should go hand-in-hand with improved irrigation. He said, further, and with justifiable bitterness, "A country which for lack of coal pays to foreigners, in normal times, 4½ million pounds yearly merely to sustain her feeble and deficient industries; a country which buys from foreigners £56,000,000 worth of manufactured goods yearly, and more than £2,000,000 worth of cereals; which allows the treasures of her moving waters to escape, waters which half utilised would produce the moisture necessary for agriculture and the force needed for the production of articles for home consumption, would produce such riches, agricultural and industrial, that we could export instead of importing; such a country, I say, has no right to think, discuss, or act, on any subject until a plan for utilising our available water powers is thought out, discussed, and put in operation."

One of the best known authorities on the subject, Senor Irrutia, points out in his recently published study, "La Energia Hidroeléctrica de Espana," that 90 per cent. of the waterfalls are in the possession of speculators who have no intention of developing power, but are simply hanging on for a rise in value. It is likely that these speculators will have a rude awakening. According to *La Energia Eléctrica*, "The Minister of the Interior is now studying the subject, and will shortly present to the Cortes various projects, amongst them a general scheme of public works, construction of railways, and exploitation of mines. It is also proposed to legislate on the concession and development of waterfalls. Seeing the lack of coal in Spain, it is very necessary to stimulate the exploitation of new falls, and the Minister proposes to reform the law in the direction of nationalising the development of waterfalls, giving the State the right of expropriation of all those concessions which are not being worked. According to our information, it is proposed to divide Spain into zones, obliging the supply authorities of each zone to form a kind of 'trust,' with the ultimate object of nationalising those falls which are to-day in the hands of foreign capitalists."

Circumstances are forcing Spain along the path of progress. There is, however, a serious obstacle in the way, *i.e.*, the construction of large water turbines and electric generators. Hitherto these have been imported, but outside sources are not now available. One of the largest American makers of turbines recently wrote to me: "While there is a great need for water-power development in Spain as well as other countries, very little is being done just now, and until conditions change we do not look for an improvement." The same is true of British makers, and it is a matter for regret that they cannot seize the present opportunity. It is doubtful if Spain, unassisted, can manufacture all the necessary heavy machinery either this year or during the next five years, but assuredly she will try to do so. And after the war, as before, Germany will again be supreme in the Spanish field, while England will lose the greater part of the trade in coal, without any compensating increase in the supply of manufactured goods.

NATIONAL ELECTRICITY SUPPLY.

THE report of the Committee appointed by the Board of Trade to consider the question of electric power supply was issued last week, as briefly mentioned in our "Notes," and can be obtained from H.M. Stationery Office at Imperial House, Kingsway, London, W.C. 2 (Cd. 9062. Price 3d. net.). The following is an abstract of the report:—

The terms of reference were as follows:—"To consider and report what steps should be taken, whether by legislation or otherwise, to insure that there shall be an adequate and economical supply of electric power for all classes of consumers in the United Kingdom, particularly industries which depend upon a cheap supply of power for their development."

The reports of the Coal-Conservation Sub-Committee of the Reconstruction Committee, and of the Electrical Trades Committee appointed by the Board of Trade, were laid before the Committee, which, on May 14th, 1917, unanimously came to the following conclusions:—

1. That when British industry is subjected to the test of keen international competition after the war, its success will depend upon the adoption of the most efficient methods and machinery, so as to reduce manufacturing costs as much as possible.

2. That a highly important element in reducing manufacturing costs will be the general extension of the use of electric power supplied at the lowest possible price, and it is by largely increasing the amount of power used in the industry that the average output per head, and, as a consequence, the wages of the worker, can be raised.

3. That the present system under which a supply of electricity is provided in a large number of small areas by separate authorities, is the result of a policy adopted at a time when the applied science of electrical engineering was in its infancy, and is incompatible with anything that can now be accepted as a technically sound system.

4. That the interconnection of existing electrical supply stations, recommended by the Board of Trade in their letter of May 25th, 1916, however desirable in itself, cannot alone meet the requirements of the situation.

5. That a comprehensive system for the generation of electricity, and, where necessary, re-organising its supply, should be established as soon as possible.

It was then decided to invite representative Associations throughout the country to give evidence with regard to the best methods of giving effect to these conclusions.

A letter was written by the Electrical Trades Committee to the President of the Board of Trade on January 19th, 1917, stating that witnesses had been unanimous in showing how greatly the electricity supply industry was now handicapped by the following facts:—

Electrical legislation in the past had restricted the proper expansion of the supply industry—the electrical areas were too parochial and entirely discordant from the economic area of electrical supply. The result has been a great growth of small uneconomical stations, with resultant waste of coal, and generally higher charges for energy than would have been the case from larger areas and greater concentration of plant in larger units, and more economically placed power stations.

Past lack of foresight in the granting of authority for the supply of electricity had allowed even adjacent undertakings to establish works differing, not only in type of plant and mains, but also in pressures and frequencies, with the result that linking-up and interchange of power was now extraordinarily difficult and costly.

There was no authority, nor any effective legislation, which empowered any authority to ensure that the best system should be adopted in the national interest in any district.

Electricity supply was of such vital importance to the military needs, and the industrial welfare of the nation; and to the future economy of coal, that the Committee felt it was essential that the direction of all matters concerning the future development of this industry should be in the hands of a new and independent Board of Commissioners, free from political control, and untrammelled by past traditions, to which should also be entrusted the general administration of the Electric Lighting Acts.

It has been conclusively proved that a municipal or Local Government area is rarely the most economical area of electrical supply; and the state of uncertainty as to whether or not action will be taken under the purchase provisions of the Electric Lighting Act, 1888, and as to their interpretation, has undoubtedly been adverse to the full and proper development of company undertakings subject to these provisions.

The right of veto exercisable by municipal authorities on the erection of overhead wires is another factor which has greatly militated against expansion and development, and has raised the cost of the electricity supplied.

Owing to the chaos of different systems, and the absence of any attempt to standardise pressures and frequencies, co-operation between neighbouring authorities is difficult and expensive. In London, for example, there are seven railway and tramway systems which generated electricity for the purposes of traction at differing frequencies—one at 50, two at 33⅓, and four at 25—thus rendering exchange of electricity between them impracticable except at the great expense involved in converting it.

Other causes have retarded electrical progress in the United Kingdom. Manufacturers have been slow to take a public supply of power partly through a mistaken reluctance to being dependent on others for anything they can make themselves. The same tendency has been shown in the past by most of the railway companies, but a change of view is taking place, and it is generally recognised that in electricity supply there must be more co-operation—less isolation—if the country is to progress with the rapidity which new circumstances demand.

To sum up as regards the present position, the evidence given was unanimous in declaring it to be unsatisfactory, and the opinion of practically every witness was that something must be done, and as speedily as possible.

The Committee has been impressed by the evidence placed before it with regard to the North-East Coast system. The costs of the electricity delivered over this wide area bear out in practice the contention as to the advantages to be gained by centralisation of the control of generation and main trans-

mission over large areas. There are instances in the country of low costs in small areas where the load is very concentrated, but the object to be kept in view is not merely to have exceptionally low costs in one or two small and specially favoured spots, but rather to have the same or lower costs available over wide industrial areas.

The general consensus of the evidence given was that the need for the creation of one central authority to regulate the generation and distribution of electricity in Great Britain and Ireland is urgent, and that in the national interest steps should immediately be taken to establish it. With this view the Committee is in complete agreement. This new authority should be known as "The Electricity Commissioners." The powers connected with the generation and supply of electricity, at present exercised by the Board of Trade, Local Government Board, Local Government Board for Ireland, and Scottish Office, should be transferred to the Commissioners, who should be appointed by the President of the Board of Trade, and through him responsible to Parliament. They should be endowed with very full powers. Their duties should not be confined to framing and administering regulations and deciding questions brought before them, but should include the *encouragement* of the supply and distribution of electricity.

It is essential that the Commissioners should be men of high standing and ability. They should in the first instance be five in number. Three of these Commissioners should be appointed on the terms that they should not hold office beyond the age of 65; that they should have substantial salaries, not less than £3,000 per annum; and that their whole time should be given to the service. They should also have adequate pensions. The ordinary Treasury scale of pensions does not appear to be suitable in this case. The other two Commissioners might be appointed for a short term of years, and neither the age limit of 65, nor the right to a pension need apply to them. Engineering qualifications and business experience of the highest order should be represented in the personnel of the Commission. The staff employed should include a Secretary and such electrical engineers and inspectors as may be necessary. The work falling on the Commissioners at first, and for some years, is likely to be heavy, but it is probable that later three Commissioners will suffice. The whole expenses of the Electricity Commissioners might be recovered from the electricity undertakings of the country by a charge levied upon them *pro rata* to revenue.

As soon as possible after their appointment the Commissioners should proceed to delimit suitable electrical districts. The great industrial districts should first be dealt with, and especially those in which there is now no combined supply. It will not be necessary in the first instance to delimit districts in portions of the country where no important electrical development can immediately be anticipated.

The question is evidently very urgent in the Lancashire district, the area around and including Birmingham, and certain Yorkshire industrial districts. In London the matter has been pressing ever since 1905, when the question of reorganisation of the supply was raised in Parliament.

The most satisfactory scheme must be based upon single ownership in each district of the generating stations and main transmission system. In the national interest, generating stations and main transmission lines ought, as a general rule, to be publicly owned, and for this purpose a District Electricity Board should be set up in each of the districts when constituted, to which the generation and main transmission system should be transferred. The Order of the Commissioners which delimits the district should incorporate the District Electricity Board. The District Electricity Boards should be established:—

(*a*) To acquire all the generating stations and main transmission systems within their districts (excepting stations for private supply).

(*b*) To link up and develop the supply of electricity.

(*c*) To erect new stations as and where necessary.

(*d*) To acquire and utilise wherever practicable surplus electricity, and waste gas and heat, and other sources of power.

District Electricity Boards should have power to acquire generating plants of magnitude at present owned by railways, tramways, or other public utility concerns, and the supply to these undertakings should be combined with that to other consumers of power. Main line electrification may not take place immediately, but will undoubtedly come. Meantime, large extensions of the use of electric power for railways in connection with urban, suburban, and special goods traffic, are imminent. The importance of combining the supply to railways, tramways, and other classes of consumers, is beyond doubt, and each of them will benefit thereby. Combination will also save duplication of capital expenditure on reserve generating plant which would otherwise be necessary.

It is not suggested that there should be restrictions in regard to ownership or the setting-up of private installations, where electricity is generated for the owner's own use, and not for sale. However, in cases where new private generating plant is installed, it should be subject to regulations of the Commissioners as to type of current, frequency and voltage, in order that it may fit in with the general system.

The installation and extension of the generating plant and main transmission lines, and the management and working thereof, included under the term "operation," should be carried out:—

1. By the District Electricity Board.

2. By a company under lease from the District Electricity Board, such company preferably to be composed largely of consumers within the area affected.

3. By an existing power company under lease from the District Electricity Board.

The method of operation should be decided by the District Electricity Board, and should be subject to the approval of the Commissioners, to whom appeal by those interested may be made. Whichever method is decided upon should apply to the whole district.

If the first method be adopted, then, as the object aimed at is the supply of electricity at the lowest possible price, it is essential that the District Electricity Board should make no divisible profit.

The transfer of the whole of the electricity undertakings from their present owners to the Boards will be a large operation, and will involve the raising of considerable sums in future for extensions and new generating stations. It may be necessary to finance the Boards in whole or in part by funds raised with Government assistance, or, on the other hand, it may be possible to finance the Boards locally without resort to such assistance.

Boards might be of three types:—(*a*) Nationally financed, (*b*) locally financed, (*c*) mixed boards, *i.e.*, a combination of (*a*) and (*b*) in varying proportions. In every case the Boards shall be as small in size as possible. This policy will tend to secure the selection of the most suitable persons, and will otherwise conduce to efficiency.

District Electricity Boards which are *nationally financed* should be composed of representatives of the local authorities now supplying electricity within the district selected by ballot of an electoral body nominated *ad hoc* by the several authorities every three years; of companies (including power companies) distributing electricity, selected by an electoral body formed under regulations of the Electricity Commissioners; of consumers paying £200 per annum or over for electricity, elected under regulations framed by the Electricity Commissioners; and of the railway companies using electricity within the district.

Power should be given to the Commissioners to fix by Order the proportion of the representation of each interest in a district.

If a satisfactory scheme for a *locally financed* or mixed Board is proposed for the district and accepted by the Commissioners, when settling the proportion of representation of each interest on the Board, they would necessarily take into account the financial responsibilities undertaken by those bodies which become responsible for providing the capital to buy out existing generating stations and/or undertakings, and to construct new stations and main transmission lines.

It may be advisable in an exceptional district, the outstanding feature of which is an undertaking, whether municipal or company, already supplying power on a large scale and over a large area, and able and willing to develop that supply at its own risk, that the municipal authority or the company, as the case may be, should continue, subject to conditions laid down by the Commissioners.

All generating stations belonging to local authorities, electric lighting companies, and power companies should ultimately be taken over by the District Electricity Board—good and bad. The terms should generally be payment of the actual amount expended on lands, buildings, and plant for generating purposes, less depreciation, reserve funds, renewal funds, and sinking funds which have been provided, and which are properly applicable to the generating stations.

In the case of railways, tramways, docks, and other public utility undertakings, the District Electricity Board should have power to take over the generating stations, but an undertaking should in such cases be given that electricity will be supplied to them at least as cheaply as they could have produced it themselves.

The District Electricity Board may realise any generating stations taken over which are not required, and acquire new sites, erect new stations, and lay new main transmission lines.

With regard to distribution systems, in the case of the local authorities the distribution system may be acquired on terms similar to those proposed in respect of generating stations, in cases where distributors wish to discontinue.

In the case of electric lighting companies, distribution should either by transferred to the District Electricity Board on terms fixed by agreement, or should remain in the hands of the company until the earliest date at which the concession may be terminated.

In the case of the power companies, in some instances, it may be suitable also to buy their distribution systems by agreement. The Board should have, in addition to the powers of the power company, the right to distribute energy for lighting, as well as power, in those places where there is no lighting supply.

In all cases where the distribution system is not acquired, the District Electricity Board must undertake to supply the distributors with electricity at least as cheaply as they could have produced it themselves in similar circumstances.

Except in the case of the transfer of undertakings owned by local authorities, in which case the purchase price should be discharged by a terminable annuity to be used by the local authority in discharging their loan obligations, pay-

ments should be made in cash, which, in the case of nationally financed Boards, would be provided by issues of electricity stock through the Treasury.

The District Electricity Boards should have powers of laying main transmission lines throughout their areas, and powers of distribution in all parts of their areas where there is now no public supply.

In order to ensure that the business of the District Electricity Boards is conducted under proper financial safeguards, provision should be made for supervision by the Electricity Commissioners.

In cases where operation by a commercial company may be found preferable the District Electricity Board may lease their undertaking on terms to be approved by the Commissioners. The terms of any lease should provide, *inter alia*, for the regulation of the amount of the distributable profits by the imposition of a sliding scale, a system of rebates to consumers, or otherwise, as may seem best calculated to secure a community of interest between the lessees and consumers.

A scheme of public ownership and company operation was prepared by the London County Council and deposited as a Bill in the Session of 1915, but not proceeded with. There is no part of the United Kingdom in which combination in supplying electricity is more urgently required in the public interest. It is to be regretted that both the municipalities and the companies operating in the County of London have made so little use of the existing facilities for combination given to them in the Acts of 1908 and 1910, and more drastic steps than those proposed by the London County Council in 1915 are now called for.

Distribution, especially in the case of the larger towns, should generally be left in the hands of present distributors, unless they wish to transfer it. Municipalities and other local authorities should distribute electricity without seeking to make a profit for the relief of local rates. It is undesirable to hamper industry by overcharging consumers of electricity for the benefit of other ratepayers.

The District Electricity Board, or its lessees, should be advised by engineers of the highest standing, whose advice and assistance should be available in connection with the distribution as well as the generation of electricity. The distributors must recognise that distribution is as important as generation, and requires the same skilled technical direction. It would be a fatal policy if the distributors were to attempt to cut down their engineers' salaries, just when the new and cheaper bulk supply ought to make them busier than ever.

Although under the Committee's proposals and the development which may be expected to flow from them, there should be new and improved openings for engineers and other officials, provision should be made by which District Electricity Boards may provide compensation for displaced engineers and other officials in cases of hardship.

The Electricity Commissioners should have considerable powers to make final Orders, and new Orders authorising the supply of electricity under the Electric Lighting Acts in areas with a population of less than 5,000 should not require confirmation by Parliament. This would enable the many non-statutory undertakings which exist, especially in small towns in Ireland, to be put on a legal basis at small cost. But where an Order is proposed to be made which involves changes of magnitude, those affected should have a right of appeal to Parliament.

An approximate statement of the capital invested in public electricity enterprises is given below for the year 1916. There were at that time 230 companies and 327 local authorities operating undertakings under statutory authority for the supply of electricity to the public. Their capital expenditure had been:—Companies £36,000,000, local authorities £55,000,000; total, £91,000,000. A large percentage of this total has been expended on the distribution systems, which in most cases will not be transferred. The average percentage of expenditure on lands, buildings, and plant for generating purposes is a little under 50 per cent. of the total.

The cost of the developments undertaken during and immediately after the war will be greatly enhanced by the abnormally high cost of materials. It is generally expected that high prices will prevail for some time after the conclusion of peace. The postponement of all developments until a time when prices have receded to what may be considered a normal level would be most regrettable. The provision of adequate electric power is required for the resuscitation of industry. The problem caused by abnormal costs of new work must be faced. The benefit of industrial activity in the years immediately following the war will be of immense importance to the nation, and anything that contributes to it will be of general advantage. The Committee therefore recommends that the Government should go a long way in giving financial assistance, so that installations which are shown to be urgently required, and which are undertaken during a time when the cost of manufacture and erection is admittedly abnormal, should not be unduly burdened by charges for interest and amortisation. The Committee emphasises the vital importance of the matter.

The future development of electricity in many districts will depend largely upon facilities being granted for the use of overhead lines, and it is of vital importance that restrictions which exist at the present time should be removed or amended. It will not only tend to cheapen the supply to consumers in industrial districts, but will also be an important factor in developing the use of electricity for agricultural purposes. The powers of the Board of Trade, which would be transferred to the Electricity Commissioners, should be a sufficient protection against overhead lines being placed along routes which are undesirable. Whilst the local authority should have a voice in regard to such matters, their absolute veto on the construction of overhead lines should be abolished.

Further facilities should be afforded for the placing of electric lines, either underground or overhead, across private property. Undertakers are at present dependent on obtaining wayleaves from owners or lessees. This restriction has been found in many instances to result in difficulties in arranging for suitable routes across country, owing to the arbitrary action of landowners and lessees in absolutely refusing to consider applications for wayleaves or in demanding exorbitant rents, or making unreasonable conditions. One landowner or lessee is thus in a position to compel an electric supply authority to make alterations in route in respect of which consent had been obtained from other landowners, or even bring about the abandonment of the proposed supply, owing to the heavy additional costs which would be incurred by having to adopt a more circuitous route. Power should be given to the Electricity Commissioners to authorise the placing of electric lines over, under, or across any private lands, and that the compensation should be assessed by arbitration after the work has been done, in the same manner as compensation is assessed for the laying of sewers under the Public Health Acts. The existing statutory provisions for the protection of telegraphic and telephonic wires should be revised with a view to modifying the present restrictions.

The local rating system as applied to electric transmission mains must greatly, and unjustifiably, interfere with the supply of cheap power, and enhance its cost. As the use of electricity has come in since the Acts on Valuation and Rating were framed, it seems necessary that they should be revised. Their application to electricity undertakings and appliances should be settled on economically sound principles and clearly defined. The matter is one which calls for the immediate attention of the Government.

The importance of water for condensing purposes cannot be over-estimated, and facilities should be afforded for the acquisition on equitable terms of rights to use water, other than potable, particularly from canals and other navigable waters.

The Electrical Trades Committee in its report states that the national advantages to be gained from a well planned scheme of reconstruction will be inestimable. "The items which are capable of reasonable calculation such as saving in fuel, reduction in factory costs, and increased output, will together represent not less than £100,000,000 per annum," and "witnesses of high authority estimate the loss incurred by the nation through failure to take full advantage of electrical progress at not less than £100,000,000 a year, a loss preventable by concentrating generation under improved administration." As a result of the improvements recommended, and the development which may be expected to proceed from them, the use of electricity for domestic purposes, such as lighting, heating, cooking, and small power, will greatly increase. The cumulative effect of a really cheap supply of electricity, on town conditions in particular, would be most marked. The saving of labour would be great, while the reduction of air pollution by smoke would result in a lower death rate from bronchial diseases and phthisis. It has been estimated that the measurable damage done to property in Manchester and Salford alone, by smoke, amounts to nearly £1,000,000 per annum. This is equivalent to about £1 per head of the population. The results of a recent similar inquiry in Pittsburg, U.S.A., show a very much larger proportionate figure. Even allowing that only a portion of smoke damage could be avoided, the saving would be large.

In view of the fact that the numerous investigations of the Reconstruction Committees, and the proposals made by them, must largely depend for their practical effect upon the supply of cheap power, the Committee in conclusion emphasises the importance of initiating the necessary legislation with the least possible delay.

The report is signed by Sir Archibald Williamson (Chairman), Mr. H. Booth, Dr. J. F. Crowley, Messrs. J. Devonshire, Harold Dickinson, James Falconer, G. H. Hume, John Kemp, Vesey Knox, H. H. Law, C. H. Merz, Sir Charles A. Parsons, Ald. C. F. Spencer, Mr. W. B. Smith, Sir John Snell, and Mr. A. J. Walter.

Tramway Workers and Industrial Councils.—The annual conference of the Amalgamated Association of Tramway and Vehicle Workers, at Birmingham, approved of the executive's action in affiliating with the National Transport Workers' Federation, and proceeded to discuss the question of the setting-up of industrial Councils on the lines of the Whitley Report. The general secretary reported that as the result of conferences with the Municipal Tramways Association and the Tramways and Light Railways Association a joint Sub-Committee was appointed to draft a scheme. The present District Councils of the Association will form the backbone of the District Industrial Council under the scheme.

LEGAL.

Workmen's Compensation Case.

At Preston County Court, last week, Judge Sturges gave judgment in a compensation action brought by Mrs. Bessie Gilleard, a lathe hand, against Messrs. Dick, Kerr & Co. for injuries to her hand caused by an accident, which she claimed had arisen out of and in the course of her employment. Concealing her tea-can in the gear box of an adjoining machine to prevent it being stolen or used, she got her fingers trapped and damaged. The answer was that the accident did not arise out of the woman's employment, and that she was not authorised to tamper with the gear box in any way.

Judge Sturges said he was bound by the decision of the Court of Appeal in a similar case, which was that the workman was not entitled to recover, and accordingly he entered judgment for the respondents.

Colliery Manager Fined.

At Wakefield, on May 31st, F. H. Waterhouse, manager of Crigglestone Colliery, was fined £5, and £13 16s. 6d. costs, for a breach of the Electricity Regulations under the Coal Mines Act, by failure to provide automatic switches to cut off the current. Two men were injured by a fault which occurred in January. The defence was that Mr. Waterhouse had been endeavouring to get the switches ever since the electric system was installed in the spring of 1917, but had been unsuccessful owing to the manufacturers being on war work.

Farley and others v. Truscott.

Electric Fittings Landlord's Fixtures.

Mr. Justice Rowlatt in the King's Bench Division, on May 29th, heard an action which raised an interesting question as to whether electric lighting fittings put up by the tenant were the property of the landlord or the tenant. The case took the form of a claim for an injunction to restrain the defendant from removing the electric light fittings from a house at Canterbury, of which he had been tenant. It appeared that the electric installation was in the house when defendant took it, but the fittings, being obsolete, were removed and stored for the landlord, and others were put up in their place at the tenant's expense, and he claimed the right to remove them. The plaintiff, on the other hand, contended that under the terms of the lease they, with all other fixtures, became his property, even including the electric bulbs and pendants.

With regard to the bulbs, His Lordship observed that the landlord might just as well claim that a tenant could not remove candle from candlesticks fixed to the walls, or hats from hat rails similarly fixed.

Counsel for the defence said that it had been laid down that lamp shades, globes, and bulbs were chattels, and therefore the tenant's property.

His Lordship, after having heard arguments on both sides, said that the plaintiff was entitled to succeed. The matter turned entirely upon the construction of the lease, and especially upon the construction of the covenant which provided that the tenant should surrender and yield up the fixtures which at the date of the lease, or at any time during the term, "shall be thereon." The word "fixtures," as he understood it, meant something other than chattels. Although the globes, shades, and bulbs might be the tenant's property, the lamps themselves, if they were in any way attached to the freehold, were not. The tenant's fixtures, too, became the property of the landlord unless they were removed during the tenancy, and in this case they were not so removed. Moreover, in this case the words of the covenant excluded the right of the tenant to remove any fixtures. The plaintiff was therefore entitled to succeed in his action, but the tenant was entitled to claim all bulbs, shades, and globes.

Judgment was entered for the plaintiff, with costs.

Forbes v. M. & B. Kinemas, Ltd.

In the City of London Court, on June 4th, before his Honour Judge Rentoul, Mr. Archibald S. Forbes, electrical engineer of Clapham Park, sued M. & B. Kinemas, Ltd., 46, Gresham Street, E.C., for £11 for repairing two dynamos, wiring up, &c., for kinema arcs, repairing small projector motors, and other work.

Mr. Sinclair Cox, for the plaintiff, said that defendants owned a picture palace known as "The Better 'Ole." Plaintiff's case was that he made it a "better hole still" by doing a considerable amount of work in connection with their electrical system. He was in the service of an electric supply company, and the work for the defendants was done in his spare time. For 60 days he worked for the defendants from time to time. On six occasions he worked through the night, and once he worked right on till 2.30 next afternoon. He reckoned that he spent about 300 hours, and his charge worked out at 9d. per hour, which was very small for an electrical engineer of any skill at all.

Plaintiff said that he was not a member of an electrical institution, but he had passed an examination at the Polytechnic, Birmingham, some years ago, and was now a shift engineer in charge of a sub-station.

Mr. H. Roger Sadd, for the defendants, said that £1 had been paid, and defendants had paid £4 into Court, which was enough to satisfy plaintiff's claim.

Judge Rentoul, K.C., found for plaintiff for £7 10s.

WAR ITEMS.

Wounded Soldiers Entertained.—The employés of the Phœnix Dynamo Manufacturing Co., Ltd., of Thornbury, provided a tea and evening's entertainment on Saturday week, for patients at the local military hospital.

Trading with the Enemy.—The "London Gazette" for May 31st contains a further list of persons and bodies in the following countries with whom trading is prohibited:—Argentina, Paraguay and Uruguay; Bolivia; Brazil; Chile; Colombia; Ecuador; Guatemala; Hayti and Dominican Republics; Mexico; Netherlands; Netherlands East Indies; Nicaragua; Norway; Peru; Salvador; Spain; Venezuela.

The Askwith Award and Uncertified Undertakings.—A Munitions Tribunal was held at Exeter on Monday to hear a complaint of the National Union of General Workers against the Exeter Corporation (Electricity Department) of alleged failure to conform to an award made in respect of employés on the production and distribution of electricity. The award was 15s. a week on pre-war rates as from August, 1917, and 20s. per week as from the first full pay in December, 1917. The proceedings affected about 14 men. Mr. G. H. Young, Southern District Organiser, said when they were before the Committee on Production the Chairman of the Exeter Electric Light Committee stated that the Committee felt that it was bound by the Askwith award. Mr. G. B. Allon, Deputy Town Clerk, denied that any such admission was made. The Tribunal held that the question to be gone into was whether the Askwith award applied only to certified undertakings, or applied to all electricity undertakings, or whether it applied only to certified undertakings and electricity undertakings which were supplying munition works. Another point was that if the award did apply, did it merge in the Committee on Production's award, or, if it did not, whether the evidence as to any statement made accepting responsibility for the 12½ per cent. bonus made it apply. These were matters which would have to be gone into very carefully. The Tribunal wished to see the Chairman of the Electricity Committee, and to read the shorthand notes of the proceedings before the Committee on Production. The case was adjourned for a fortnight.

Building After the War.—The Committee of the Ministry of Reconstruction which is making an inquiry throughout the country from local authorities, builders, architects, and others as to the probable demand for, and supply of, building materials during the reconstruction period two years after the war, has extended until July 1st, 1918, the date upon which the inquiry forms already sent out are to be returned. The Committee hopes that any authority, person, or firm contemplating building works immediately after the war who has not received one of the Committee's forms of inquiry will apply, either directly or through an architect, to the Secretary of the Building Materials Supply Committee, 6a, Dean's Yard, Westminster, for a form. In cases where only sketch plans have been prepared, and the preparation of complete plans and bills of quantities has been postponed until after the cessation of hostilities, it would appear that no materials will be required until at least six months after the war, and as regards these works it will suffice if the undermentioned particulars are furnished:—

County.
Description of building.
Estimated pre-war value of the work.
Estimated date of commencement of building.
Estimated duration of contract.

Wherever possible, however, approximate quantities of materials needed should be furnished, especially in the case of building stone and bricks, steel, and timber. Materials needed for repairs, maintenance, &c., form the subject of a special inquiry, and particulars of these are not needed at present. In other matters, however, it is hoped that every effort will be made to complete forms of inquiry by the date specified. Unless the Committee is made fully aware of the prospective needs of consumers, it will not be possible to estimate how far the available supplies will meet the demand, and its efforts to secure co-ordination may thus prove unsuccessful.

Exemption Applications.—The National Service Representative asked the Fulham Tribunal to review the certificate of conditional exemption granted to Mr. S. J. W. Scott, electrical engineer, 36 years of age, married, and passed for general service. He stated that he was working at the Belgian Refugees' Camp, Earl's Court, attending to the electrical plant in the camp and workshops. He was a member of the V.T.C.,

and devoted a considerable part of his time to anti-aircraft work. The Tribunal cancelled the certificate, but notice of appeal was given.

At Southport, exemption was claimed by a fireman (36, Grade 1) in the electricity department of the Corporation, but he was ordered to report for service by July 1st.

At Newcastle-under-Lyme, exemption was sought by the partner in a firm of electrical engineers, and he was given until the end of June to be graded.

At Oxford, the Electric Tramway Co. appealed for V. Hill (36, Grade 2), foreman driver, and three months' temporary exemption was allowed.

At Torquay, in an appeal by H. W. Drury (Grade 2), electrical engineer, it was decided that he should be available for service by July 1st, and it was recommended that he should be employed in his profession.

At Burnley, an electrical engineer (37, B 1), who appealed for exemption, claimed to be in a certified occupation, and said that his workman had been badged. His business was mainly maintenance work, and if he had to go into the Army it would have to close. He was given until the end of August.

Before the Somerset Appeal Court, the Porlock and District Electric Light Co., Ltd., appealed for the retention until July 1st of S. H. Arnold (26, Grade 1), engineer in sole charge of the power plant. It was stated that the loss of Arnold would mean the closing down of the business, and the company asked for a little time to get their affairs settled. It was decided that Arnold should be available for service by July 1st.

At Amersham, the National Service Representative withdrew an appeal he had lodged against E. Band (31, Grade 2), electrical engineer, of Wedmore.

At Burnham-on-Sea, exemption was refused to C. E. King, shift engineer and switchboard attendant at the electricity works.

An appeal was made to the Dorset Appeal Court, at Dorchester, by T. H. Escott, branch manager for Messrs. Brooking & Co., electrical engineers of Weymouth, and he was given exemption until the end of August.

At Grange, the National Service Representative appealed against exemption held by E. S. Brown (27), electrical fitter with Mr. T. Wilkinson. The appeal was assented to, and the exemption cancelled.

At Canterbury, the National Service Representative appealed against exemption to August 13th granted to S. Terry (29), electrician, of St. Dunstan's Street. The case was heard *in camera*, and the appeal was allowed, but respondent is not to be called up until August 13th.

The West Kent Appeal Court has granted two months' exemption pending substitution to C. F. Mounsden (34, Grade A), engineer to the Sevenoaks and District Electricity Co., on the understanding that every effort was made to obtain someone to release him.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

The Future of Small-Station Managers.

A Government Report has recently been issued recommending drastic changes in the organisation and administration of supply undertakings. As is well known, the scheme involves the supersession of small generating stations and the amalgamation of adjacent supply areas.

While this matter has been discussed in the Press for months, nothing appears to have been put forward regarding the method of dealing with the existing administrative staffs. No doubt many of the managers of the larger undertakings will secure remunerative berths under the new *régime*, but what is to happen to the engineers connected with the smaller schemes? Many of these men have held their positions for a number of years and are getting past the first blush of youth, or for other reasons would find considerable difficulty in securing suitable employment elsewhere. Further, for years past such engineers have been grossly underpaid, so that they have not been in a position to put by for the proverbial rainy day, and, moreover, some have young families to start out in life. Electrical engineers, as a body, have been too jealous of their professional reputation, and have looked upon the practice of their profession as something more than a mere wage-earning business, and, therefore, have not adopted Trade Union methods. Had they done so they would doubtless be in better circumstances to-day, and, moreover, would have the advantage of a powerful organisation behind them to ensure that justice was done them.

I believe it is the solemn duty of the Institution of Electrical Engineers to take such steps as will ensure that all those engineers who are deposed shall be properly compensated. It is, doubtless, within the memory of many that in the past, in cases where offices have been abolished due to amalgamation of districts, and so on, the compensation or pensions awarded to the holders of the offices has been ludicrously inadequate. Unless drastic steps are taken at once it appears that similar injustices will be perpetrated in the near future.

Bray, *June 3rd*, 1918. **Wm. J. U. Sowter.**

[We refer to this matter in our leader to-day.—EDS. ELEC. REV.]

BUSINESS NOTES.

Non-Ferrous Metals Licences.—A list of companies, firms, or individuals to whom licences have been granted by the Board of Trade under the Non-Ferrous Metal Industry Act, 1918, appears in the *London Gazette* for May 31st.

German Lightning Conductor Makers.—The latest syndicate to be formed in Germany is one embracing all the principal makers of lightning conductors in the country. It is known as the Verband Deutscher Blitzableiterfirma.

South African Mines.—The official returns of electrical machinery and energy supplied to the mines of the Union of South Africa during 1917, as compiled by the Mines Department, are as follows :—

Electrical machinery, including spares	£369,781
Electric power and light purchased	£1,376,088
Electric detonators or fuses	£11,645

—*South African Mining Journal.*

Trade Representation Abroad.—Cases have recently been brought to the attention of the Department of Overseas Trade (Development and Intelligence) by His Majesty's Trade Commissioners in which United Kingdom firms have broken off their relations with their agents abroad on the ground that, owing to preoccupation of war work or other difficulties, they are unable to deliver goods for export.

The difficulties experienced by manufacturers in maintaining their overseas trade are fully appreciated, but it is also well to bear in mind the position of overseas agents who find themselves unable to obtain their normal supplies of goods from the United Kingdom. It will not be disputed that a good agent is as valuable an asset to a manufacturer as any unit in his manufacturing organisation, and that the retention of his services may assist materially in keeping together the goodwill of the manufacturer's connection, even if orders from overseas cannot be executed. It may also be pointed out that the severing of connections with a good agent must necessarily lead to the agent seeking other principals, and so transferring his services and experience to a competitor.

The majority of British manufacturers have, no doubt, taken these facts into account, and instances have been brought to the attention of the Department in which the manufacturer has arranged to pay his agent a sum based on the commissions earned by him in more normal times. There have, however, been cases in which it has appeared that the position of the agent cut off from his normal supplies is not always fully realised, and it therefore seems worth while to call attention to representations made more than once by Trade Commissioners that a manufacturer who is unable to execute orders from abroad owing to war conditions should give serious consideration to the desirability of taking special steps to retain the services of a good agent, whether by the payment of a retaining fee or in some other way.—*Board of Trade Journal.*

Foreign Trade Department.—The address of this Government Department is now Bridgewater House, Cleveland Square, St. James', S.W. 1.

Royal Visit to Electrical Works.—In the course of the industrial tour of the King and Queen, last week, their Majesties visited the works of the PHŒNIX DYNAMO MANUFACTURING CO., LTD., at Bradford.

Trade Announcements.—MESSRS. FYFE, WILSON & CO. have removed to 133, West Campbell Street, Glasgow.

THE "SENTINEL" WAGON WORKS, LTD., Shrewsbury, have taken over the Sentinel Wagon Works, and all the steam wagon business lately belonging to Messrs. Alley & MacLellan, Ltd. The new company will deal with all accounts in connection with the sale and manufacture of the "Sentinel" steam wagons, their parts and accessories.

THE "Z" ELECTRIC LAMP MANUFACTURING CO., LTD., announce that Messrs. Andrews & Co., of 40, West Campbell Street, Glasgow, will act as their representatives in Scotland, their other arrangements having been cancelled, by mutual consent.

Book Notices.—"Income-Tax up to Date." By H. J. Gully, F.C.A. London: "Financial News." 9d.—This pamphlet crystallises all the regulations on the subject for the current income-tax year (1918-19), and gives a table showing the amount of tax payable on incomes between £131 and £200,000. The working of the Excess Profits Duty is fully explained.

"The Rockefeller Foundation." A review of its work in 1917. By G. E. Vincent. New York: From the Foundation.

"Labour Difficulties and Suggested Solutions." By W. J. Deeley. viii + 175 pp. Manchester: Sherratt & Hughes. Price 7s. 6d. net.

"*Journal* of the Röntgen Society." Vol. XIV, No. 55. April, 1918. London: Percy Lund, Humphries & Co., Ltd. Price 4s. net.

"*Proceedings* of the Physical Society of London." Vol. XXX. Part 111. April 15th, 1918. London: Fleetway Press, Ltd. Price 4s. net.

Exports from Canada.—The Export Association of Canada, Ltd., of 62-65, Charing Cross Road, S.W. 1, which includes in its membership prominent manufacturing houses in Canada, is placing before British manufacturers and merchants inquiry forms and other documents on which they may furnish particulars of goods, &c., of which they are in urgent need, in case these can be secured from Canada as shipping facilities permit.

Plant for Sale.—Belfast Corporation Electricity Department has a quantity of surplus plant for disposal, consisting of one 1,000-KW. and two 200-KW. steam dynamos, two surface condensers, one air pump, four steel cooling towers, four 22-H.P. electric motors, &c. Particulars are given in our advertisement pages to-day.

Lists.—MESSRS. WARD & GOLDSTONE, Sampson Works, Salford.—Supplementary price list (No. 104) arranging very compactly in 36 pages illustrated particulars and prices of a great variety of electrical supplies, including cables, flexible cords, iron-clad switch fuse and plug carrier, water-tight fittings, insulators, dry batteries, electric bell material, and general electric lighting and power accessories.

BRITISH THOMSON-HOUSTON CO., LTD., Rugby.—Descriptive list No. 4,171A (20 pages) containing a very full account, with excellent line and half-tone illustrations of their motor-operated oil break switches.

BRITISH THOMSON-HOUSTON CO., LTD., 77, Upper Thames Street, London, E.C. 4.—Price list No. 10,482, describing their flood-light projectors for use with standard half-watt type lamps.

LIGHTING AND POWER NOTES.

Aldeburgh.—REVISION OF PUBLIC LIGHTING CHARGES.—The Electric Supply Co. has asked the T.C., at the expiration of the present lighting contract next year, to enter into a fresh contract increasing the maximum price 33⅓ per cent.; lamps when relighted to be charged £2 2s. each instead of £1 17s. 3d. A Committee is to consider the matter.

Altrincham.—PRICE INCREASE.—The Electric Supply Co., Ltd., has increased the price of energy for the June quarter for lighting by ½d. per unit.

Birmingham.—YEAR'S WORKING.—The accounts for the year of the Electric Supply Committee show a balance of £64,763, of which £39,500 has been carried to renewals and special expenditure account. It is proposed to place the surplus of £25,263 to the relief of the rates.

The number of units sold during the year totalled 160 millions, as compared with 149½ millions the previous year; the increase of 10,550,763 units is almost entirely confined to high-tension supplies.

Blackburn.—YEAR'S WORKING.—The annual reports of the Corporation electricity department for the year ended March 25th last show total income, £68,379; expenditure, £44,765; gross profit, £23,614; interest and sinking fund, £19,142; leaving a net profit of £4,472, as against £2,199 net profit in the previous year; the total units generated during the year were 10,318,417, an increase of 1,481,204 units, or 16·76 per cent. on the previous year. Private lighting shows a decrease of 45,146 units and power (excluding traction) an increase of 1,784,883 units. Mr. Wheelwright, the borough electrical engineer, in his report states that the percentage of ash and clinker at times reached a figure of 30 per cent., while it has averaged throughout the year 21 per cent., or nearly double the amount in pre-war days; owing to the fact that the plant at the generating station is practically fully loaded, it has been impossible to consider applications for large amounts of power except in cases of firms engaged on work where the Government would grant priority permits for obtaining the necessary material. The engineer emphasises the importance of the erection of a new generating station, and urges the Corporation to make strong representations to the Government on the matter.

Blackpool.—WAR BONUS.—An application for a war bonus of 20s. per week and 12½ per cent. on total earnings of the clerical staff of the Corporation electricity works has been refused by the War Bonus Sub-Committee. The Committee has also declined to entertain a request from the Municipal Employés' Association that the meter readers in the electricity department should be paid "all arrears," and that the full bonus of 16s. in future—instead of 14s.—be paid to them, together with 12½ per cent. on earnings, as from October 13th last.

Canada.—It is reported that 1,000 men are working on the Chippewa power development scheme, designed to furnish an additional 300,000 H.P. for the Ontario Hydro-Electric Commission.

Chile.—HYDRO-ELECTRIC POWER.—According to the *Board of Trade Journal*, a prolonged study has recently been made by an American hydro-electric engineer into the available water power in the South of Chile, and it appears that hopes of obtaining good results are held. Concessions, it is understood, have already been secured for some 60,000 H.P., a further 15,000 H.P. being in view. It is expected that about 40,000 H.P. may be taken by a copper company, while other probable consumers are a cement company and the local electric light and traction companies.

Coatbridge.—FIRE.—On Friday, last week, a fire, which did damage estimated at £1,000, occurred at the offices of the Electric Supply Works, Dundyvan Road. The fire brigade succeeded in saving the works.

Colchester.—YEAR'S WORKING.—The report of the year's working of the Corporation Electricity Department shows total revenue £23,420, works costs £17,002, gross profit £6,417. After payment of £6,467 for interest and sinking-fund charges there is a deficit on the year's working of £49. Had it been possible to make the additional charge of 10 per cent. from October 1st there would have been a profit on the year's working, the increase only taking effect in the last quarter of the year. Number of units sold, 2,008,826, an increase of 134,922 units; maximum demand, 1,048 KW.; load factor, 21·8 per cent.; total amount borrowed, £89,814; amount repaid, £42,904.

Continental.—SPAIN.—A concession has recently been granted for the establishment of a plant to utilise the water power of the River Turio, near Chinchilla, for the generation of electrical energy for lighting and power purposes.

TURKEY.—It is announced from Constantinople that a company has lately been formed to establish a central electricity station at Caraman, in the Vilayet of Konia, for the supply of electricity for lighting and power purposes in the district.

SWEDEN.—The Harjeans Kraft Aktiebolag is the name of a new company which has lately been formed at Sveg, Sweden, with a maximum capital of £10,000, to establish a small electricity generating plant utilising certain water power available in the district.

NORWAY.—A conference was held, on Monday last, to discuss the question of the transmission of hydroelectric power between the Scandinavian countries; it is believed that Scandinavia commands sufficient water-power to supply all the energy required for lighting and power and partly for heating.

Dublin.—COAL SUPPLY.—At the Corporation's meeting on Monday last, the Electricity Supply Committee intimated that the Irish Director of Cross-Channel Transport (Mr. Burgess) proposed that for this year the coal supply to the electricity works should be only from 18,000 to 19,000 tons, or about 75 per cent. of last year's supply, and that this would mean a reduction in electricity output of from 43 to 44 per cent. It was decided to communicate with the Controllers of Coal and Shipping as to the dangerous shortage of coal reserves. It was also stated that under the best conditions a substantial reduction in supply of energy to consumers would become absolutely necessary, and that the Committee proposed a reduction to two-thirds of last year's supply at ordinary rates, charging for anything over that a price that would amount to a heavy penalty, but for the Committee's action in the matter of coal reserves it would have been necessary to have closed down on Saturday last. It was said that the Belfast Corporation had a coal supply that would last up to March next. There was no definite complaint of shortage except from Dublin.

The Irish Local Government Board has appointed Mr. P. C. Cowan, Chief Engineering Inspector, to hold an inquiry into the Corporation's application for a loan of £175,000 for the extension of the electricity undertaking and the works connected with it.

Faversham.—PRICE INCREASE.—The T.C. has decided to increase the price of energy for lighting from 6d. to 6½d. per unit to consumers of between 125 and 250 units per quarter, and from 5½d. to 6d. to those using over 250; and to charge a flat rate of 3d. per unit to power users, as from July. An overhead cable is to be run to the front pumping station, at a cost of £45, the Ministry of Food contributing £30 towards the installation expenses.

Glasgow.—PROPOSED EXTENSIONS.—On a report by the chief engineer that it would be necessary to build a sub-station at Linthouse for transforming electric energy at that point, the Sub-Committee of the T.C.'s Committee on Electricity has permitted the convener and engineer to make inquiry and purchase available ground.

Halifax.—The Tramways and Electricity Committee having been informed that the Ministry of Munitions cannot sanction the purchase of a new boiler for the electricity works, has decided to make an emphatic protest, and to state that it could not be held responsible should the electricity supply have to be curtailed through lack of steam at any time owing to the necessary boiler plant being unobtainable. Such plant is all the more necessary owing to the present unsatisfactory supply of coal, which is of very inferior quality.

Hebden Bridge.—PRICE REVISION.—The Electricity Committee has decided that from July 1st no special rate will be allowed where the consumption of energy exceeds 100,000 units.

Lanark.—At the new hosiery factory hydro-electric power generated by the River Mouse is used for driving, and also for lighting, heating, and cooking the employés' meals.

Leek.—PRICE INCREASE.—The Electricity Committee has decided that for the next half-year the charges for electricity be as follows:—A flat rate of 5d. per unit plus 40 per cent., subject to a minimum charge of 15s. per half-year, for lighting. For power, for a consumption of under 2,000 units per half-year, 2d. per unit; over 2,000, and under 4,000, 1½d.; over 4,000, and under 8,000, 1¼d.; over 8,000, 1d. Alternative power scale, £3 15s. per KW. demanded per half-year, plus ½d. per unit consumed. For overtime supply, 3d. per unit. All charges for power to be subject to an increase of 50 per cent.

London.—HAMMERSMITH.—PRICE REVISION.—The Electricity Committee has had under consideration a report from the borough electrical engineer showing the effect on the revenue of the electricity undertaking for the current year of the recent wage awards, the increased price of coal, and the reduced consumption. On the statement of the engineer, the Committee finds

it will be necessary to immediately increase the charges for electricity; proposals for carrying out the same will be submitted at the next meeting of the Council.—Boiler, &c., Plant Insurance: The Committee recommends that the insurance of the boilers and other generating plant at the electricity works against damage by explosion be increased by 100 per cent.; the risk is at present £62,300 and the premium £757 18s. The additional premium will be £378 19s.—Plant Purchase: Messrs. Gwynnes, Ltd., have made an offer to purchase the generators and motors supplied under the agreement for lighting and power for £3,500, subject to being supplied with electricity at a flat rate of 1d. per unit for both lighting and power. The rental charges included in the prices charged under the agreement were 1d. per unit for power and 3d. per unit for lighting. The Committee recommends the acceptance of the offer, the charge for energy to be plus any additional percentage charges as are at present in force or may hereafter from time to time be fixed by the Council.

Price Revision.—The Charing Cross, West End, and City Electricity Supply Co., Ltd., has applied to the B. of T. for an Order to increase its maximum price for lighting purposes from 4d. and 5d. to 6d. per unit.

Nottingham.—Year's Working.—Long-continued criticism regarding the obsolete character of the electrical generating plant is at last likely to bear useful fruit, it being announced at a meeting of the City Council on Monday by Mr. R. H. Swain, the new chairman of the Committee in succession to Sir John Turney, that schemes are in contemplation, involving an estimated expenditure of a quarter to half a million, which are designed to effect an entire upheaval of existing conditions. Obviously the work, which had been too long delayed in pre-war times, cannot be entered upon under present conditions, but the assurance is forthcoming that, with a return to normal times, there will be no further procrastination. The past year has been the most unfortunate in the history of the undertaking, which has failed to make a profit. The Committee reported that during the period 500 tons less coal had been consumed, and 216,174 more units generated at an increased cost of £4,876 for coal. The question of the provision of a new electric generating station had received careful consideration during the year. The city electrical engineer (Mr. H. Talbot), in his annual statement, mentioned that the total horse-power installed at the three generating stations was 17,030 h.p. The number of 32-watt lamps, or their equivalent, connected on March 31st was 589,159, an increase of 18,666 for the 12 months; 39 additional motors, aggregating 472 h.p., had been connected to the mains, making a total of 2,194 motors and 9,892 h.p. The number of units sold during the 12 months was:—For lighting, 3,221,768; for power, 4,899,595; and for traction 6,812,253, a total of 14,933,616 units, or an increase of 216,174. The total work costs last year were 1·50d.; in 1917, 1·35d.; and in 1916, 1·20d. The sum received from the sale of energy during the past year was £118,950. Loans have been repaid to the extent of £221,955, there being in the reserve fund £43,662. The Committee decided to increase the price charged for all electricity by a further 13⅓ per cent. upon present rates, making a total increase since the commencement of the war of 33⅓ per cent., to take effect from Lady Day.

Nuneaton.—Loan Sanction.—The T.C. has received sanction to a loan of £412 for expenditure on plant. Owing to a loss of £2,000 on the year's working, the T.C. is getting figures from other towns, with a view to revision of charges.

Rathmines.—Wage Dispute.—The members of the Stationary Engine Drivers' and Firemen's Union agreed to submit the question of wage advances to arbitration; the decision of Mr. Whitaker, K.C., was against them, and the men have now notified the local Council that they will not be bound by the Arbitrator's award, and demand £1 per week advance on pre-war wages plus the 12½ per cent. bonus. The Council has refused the application, and has warned its customers and the public that the supply of electricity for public and private lighting might have to be discontinued.

Selby.—Overhead Lines.—The R.D.C. has granted permission to the Yorkshire Electric Power Co. to extend its electricity supply to the Selby shipyards by means of an overhead cable passing through part of the Council's district.

South Africa.—Durban.—The 1917 report of the Corporation electricity undertaking shows a gross profit of £71,000, mpared with £61,000 in 1916 and £56,000 in 1915. The sum of £17,936, the same as for the previous year, was handed over for relief of rates. The total capital expenditure is £561,000, and the undertaking has altogether paid £213,000 to the relief of rates. The tariff, from ½d. to 5d. a unit, is the lowest in South Africa.

Stalybridge. — Loan Application. — The Generating Station Committee of the Joint Tramways and Electricity Board has decided to make application to the Local Government Board for sanction to borrow the sum of £8,000 for electricity purposes.

Todmorden.—Bulk Supply.—In view of the large expenditure which would be involved in replacing plant in order to make the Corporation electricity works a paying undertaking, as had recently been proposed, the Electricity Committee, last week, decided to recommend the adoption of the alternative policy of taking a bulk supply from the Yorkshire Electric Power Co. on the basis of their Scale A charges. The Town Council, last week, approved the proposal, and decided to apply for sanction to borrow £5,500 for capital expenditure in connection with the erection of the necessary sub-station.

Yeovil.—The B. of T. has extended the 1914 E.L. Order for a year.

TRAMWAY AND RAILWAY NOTES.

Bath.—Accident.—While descending a hill near Weston, on Wednesday last week, a tramcar left the rails, dashed into the boundary wall of some houses, and overturned. One passenger was killed and over 20 injured, including several convalescent soldiers. The woman driver and conductor were only slightly hurt.

Birmingham.—Year's Working.—There is a credit balance on the year's working of the Corporation tramways of £101,000; £63,898 is carried to reserve, £12,801 to the credit of motor-bus suspense account, and £25,000 to the credit of the borough fund. The traffic receipts—a record—exceeded £1,000,000 sterling.

Blackburn.—Year's Working.—In his report on the year's working of the Corporation tramways, Mr. J. H. Cowell, the general manager, shows traffic receipts of £77,658, and parcels £2,207, a total of £80,361. Working expenses were £53,231, leaving a balance of £27,129, as compared with £17,277. Interest and sinking fund charges were £20,892, as against £20,018 the previous year, and the net result is a profit balance of £6,970, compared with a loss of £2,439 last year. The mileage increased by 3,798 miles, passengers by 596,444, and revenue by £14,340; the miles run were 1,055,876, the passengers numbered 12,458,787, and the receipts per car-mile were 17·65d. Mr. Cowell pointed out that the £6,970 was not actually profit, as it included £3,000 which, under ordinary circumstances, would have been expended on the permanent way during the year, whilst in consequence of revenue not meeting requirements, the expenditure on the permanent way last year fell short by £2,000. Dealing with the proposed restrictions, Mr. Cowell anticipates the car-mileage being reduced at least 10 per cent., which will mean heavily decreased receipts, whilst the wages account will be increased by £7,000 owing to the latest award of the Committee on Production. A further revision of fares is suggested.

Blackpool.—Labour Shortage.—The Tramways Committee has decided to ask the War Office for the services of 50 men from a Labour Battalion to be placed at the disposal of the Corporation for the purpose of carrying out much-needed repairs to the tramway permanent way in the borough.

Bolton.—Bonus Application.—The Tramways Committee has received an application from the National Transport Workers' Federation for a 12½ per cent. increase on existing total earnings of all employés, or for an increase on the standard rate equivalent to it, with equal payment for both women and men, both in war bonus and on basic rates. At present the women receive 14s. 1d. war bonus, as against the men's £1 1s. 8d., but in other respects they are paid the same rate as the men. The application was not acceded to, and was referred to the Committee on Production. If granted, the increase would mean 7s. a week for motormen, 6s. 6d. for male conductors, and 14s. per week for women conductors. Stalybridge, Hyde, Mossley and Dukinfield Tramways Board, which has had a similar application, has passed no resolution on the matter. Accrington Electricity and Tramways Committee is strongly opposed to the granting of the bonus.

Bradford.—Increased Fares.—The increased fares came into operation on Saturday last. There is no alteration in fares for children up to 16 years of age, but, generally speaking, the increase is 50 per cent.; in a few cases it is higher, and the early morning fare is doubled.

The tramway manager (Mr. C. J. Spencer) has urged the local Trades Unions to endeavour to arrange work hours so that employés of all firms will not be crowding on the cars at the same time. He has also issued an appeal to ladies to finish their shopping in the quieter hours. The Trades and Labour Council has approved the appeal, and has referred the matter to a Joint Advisory Committee of the Council and the Chamber of Commerce.

Canada.—Rejected Wage Increases.—The Montreal street railway employés have rejected wage increases offered by the company. Motormen and conductors with more than five years' service were offered 37 cents (1s. 6½d.) an hour (a 25 per cent. increase); under five years' service, 30 cents. The men demand a minimum of 40 cents.

Continental.—France.—It is reported that the engineers of the Paris, Lyons, Mediterranean Railway Co. are preparing plans for the electrification of the line between Alais and Clermont. Water power is to be utilised to generate the necessary electrical energy, a large barrage at Pont de Montvert being contemplated.

Glasgow.—The manager of the T.C. tramway undertaking has recommended, and the Committee has approved, that the following sums be set aside for depreciation for the year ending May 31st next:—Permanent way. £78,511; power station and sub-station plant, £13,915; cars and electrical equipment of cars, £27,923; other rolling stock, £2,830; Clydebank bridges, £550; total, £123,729.

TRAFFIC RETURNS.—As was indicated in recent issues of the REVIEW, a series of records has again been established by the Glasgow T.C. Tramway Department. The official figures for the departmental year, which closed on May 31st, give the following traffic statistics:—Car-mileage, 26,261,231 miles, an increase of 475,184 miles; traffic receipts, £1,404,110, an increase of £158,602; traffic receipts per car-mile, 12·832d., an increase of 1·240d.; the passengers carried numbered 430,946,566, an increase of 42,651,690. So far as fares are concerned, a feature was the extraordinary boom in halfpenny tickets. These increased at an average of almost half a million a week throughout the year.

Halifax.—SERVICE REDUCTION.—A Special Sub-Committee recommends, in order to comply with the Board of Trade request for further economy in fuel and man power on tramway undertakings, that the existing stopping places of the local cars be reduced by 30 per cent.; the running of fewer cars in the quieter hours of the day; the discontinuance of late night cars; and the commencement of Sunday service at 2 p.m. instead of 1 o'clock. Joint efforts are being made locally to arrange varying times of industrial working hours, to avoid the crush for cars at particular times.

Huddersfield.—TRAFFIC CONGESTION.—A conference of representatives of the Corporation Tramways Committee, Huddersfield employers, and various industrial Trade Unions of the district was held last week to consider means of diffusing traffic by the alteration of mill hours, so as to avoid the rushes for cars at certain times of the day. It was arranged that some scheme of varying the times of starting and finishing work in different trades, or on some such lines, should be drawn up for further consideration, particularly as between employers and workpeople of the industries.

Leeds.—FARE REVISION.—The new scheme of increased tramway fares adopted by the City Council in May has been found impracticable, and the Tramways Committee, meeting last week, decided to recommend the total abolition of halfpenny fares (the original proposition). It has been found that much hardship is caused by the abolition of overlapping fares in the centre of the city.

PARCEL-CARRYING SCHEME.—The parcel-carrying scheme on the Leeds tramways, recently established, but hitherto limited to a small portion of the system, is now extended to practically the whole system, and agents have been appointed on all routes. As further special cars for parcel traffic cannot be constructed at present, the ordinary service will be utilised.

Liverpool.—FARE REVISION.—Mr. Mallins, manager of the Corporation tramways, has presented a report to the Tramways Committee on the question of the revision of tramway stages and fares. He suggests adopting a penny stage based upon an equal length for all routes—say two miles. To prevent inconvenience by the shortening of the penny stages, he suggests the introduction of a 1½d. stage. The expenditure on the tramways this year is estimated at about £130,000 more than last year, and if the suggested revision takes place there will be an increased revenue of £88,414 a year.

London.—According to the *Daily Mail*, as a means of saving power and coal, the North London Railway Co.'s electric trains are all to travel at a slower speed, and the time taken on all journeys will consequently be longer.

FARE INCREASE.—On Saturday the fares on the Northern tramway systems of the L.C.C. will be advanced into line with those on the South side of the river. Children's tickets and all odd halfpennies in fares will be abolished, the 1½d. stage going up to 2d., 2½d. to 3d., and so on. There is no intention at the moment to interfere with workmen's fares, but these will also be advanced later on.

Potteries.—FARE REVISION.—The Potteries Electric Traction Co., Ltd., has decided that on and after June 1st, 1918, all ordinary fares up to and including 2d. will be increased by ½d., and fares above that amount by 1d. A 1d. fare will be available over any single section of a route. Workpeople's and scholars' weekly tickets will still be on the basis of half the ordinary fares.

Preston.—YEAR'S WORKING.—At a meeting of the T.C. the chairman of the Tramways Committee stated that during the year ending March 31st, 16½ million passengers were carried, an increase of nearly 1¾ millions. The total income was £63,498, as against £57,776. Working expenses were £43,493, as against £36,029, the total amount paid in war bonuses being £5,880. On the present basis the annual charge under this heading would be approximately £11,090. The reserve fund was £52,231, as against £50,061, and the total debt outstanding was £129,389. It was not proposed at present to increase the ordinary fares, though that might be necessary in the near future, but it had been decided to abolish the present workmen's fares, which gave four miles' travel for 1d., or eight miles for 1½d., and to substitute new rates on the basis of a single fare for the double journey, thus complying strictly with the Parliamentary schedule for workmen's fares. The Sunday morning cars were to be discontinued, the late evening service curtailed, and the number of "request stops" reduced, in compliance with the Board of Trade Tramway Committee's recommendations.

South Africa.—DURBAN.—Accounts of the Corporation tramways last year show a gross profit of £59,696, compared with £55,828 in 1916. The total revenue was £159,254. The total capital expenditure on the undertaking was £591,991, whilst the outstanding loan debt was £510,000, and since its inception in 1899 the department has not only spent in extensions, renewals, and replacement of plant, out of revenue, £147,665, but has repaid loans amounting to £6,463, and accumulated in cash—sinking funds, £61,727; renewals fund, £16,448; accident insurance fund, £12,017; and has handed over to the borough fund for the relief of rates the total sum of £197,368. The tramcar fares in Durban are the lowest in South Africa, being an average of ·67d. per mile, based on cash fares.

Warrington.—YEAR'S WORKING.—The annual report of the Corporation tramways for the year ending March 31st shows receipts £32,697 and expenditure £22,465. The net profit was £4,503, which is carried to the appropriation account, making a disposable balance of £6,021, of which £3,000 is reserved for the relief of rates. The reserve fund has £10,000 standing to its credit.

TELEGRAPH AND TELEPHONE NOTES.

China.—A considerable demand for telephone equipment has arisen at both Mukden and Changchung. A fair share of the trade will never be obtained without personal representation. The manager of the local telephone company states that he is in a position to buy $50,000 worth of telephone material, but that he will only do so after conferring with an actual representative of some manufacturing firm. A large order obtained here would probably mean further business, not only with the same company, but in other places in Manchuria. There are numerous small telephone systems in the district, mainly owned by native merchants, and equipped with Japanese instruments.—*U.S. Commerce Reports.*

South Africa.—Durban possesses its own telephones, the only municipal system in South Africa, and its tariff is approximately 50 per cent. below the Government charges. Last year the gross profit was £17,631, and £5,400 was paid over to the rates. The sum total paid in rate relief now amounts to £37,743. The capital of the undertaking is £149,769.

United States.—A strike in the Western Union Telegraph Co., affecting 30,000 operators, is expected. The Western Union refused to follow the recommendation of the Labour Board, permitting operators to form a Trade Union. Mr. Gompers will, it is expected, appeal to President Wilson to intervene.

CONTRACTS OPEN AND CLOSED.

OPEN.

Australia.—MELBOURNE.—July 3rd. Victorian Railway Commissioners. 21 electric meters for power circuits. Specification may be consulted at the Inquiry Office of the Department of Overseas Trade (Development and Intelligence) in London.

Belfast.—June 7th. Electricity Department. 9,000 yd. of 6-core 0·1 sq. in. lead-covered, paper-insulated cable, and laying. See "Official Notices" May 24th.

Lancaster.—July 16th. Electricity Committee. 6, 9, and 12 months' supply of slack or nuts (screened and washed). Mr. J. B. Patterson, Electricity Works, Marton Street.

London.—ST. PANCRAS.—June 10th. Electricity Committee. 12 months' supply of steam coal. Electricity Department, 57, Pratt Street, Camden Town, N.W.

Newcastle-under-Lyme.—Electricity Department. One 150-KW. rotary or motor-converter set and switchgear. See "Official Notices" May 24th.

Spain.—Tenders have just been invited by the municipal authorities of Astorga (Province of Leon) for the concession for the electric lighting of the town during a period of 15 years.

Warrington.—June 18th. Electricity and Tramways Committee. High-tension lead-covered cable and medium-tension rubber-covered cable. See "Official Notices" May 31st.

CLOSED.

Hammersmith.—The Electricity Committee has granted Messrs. Cory Bros. & Co., Ltd., an increase of 15 per cent. in their charges for lighterage and demurrage for coal for the electricity station, equivalent to 3¼d. per ton on the coal supplied, the increased charge being in consequence of the recent wages awards of the Committee on Production.

Johannesburg.—Reporting on tenders for the supply of trolley wire the tramway manager stated :—

The reason further tenders have been called for is that although 5 miles of this wire has been on order from the Telegraph Manufacturing Co., since April, 1916, we have been definitely informed by them that there is no hope of delivery. Therefore, their further tender cannot be considered.

The position with regard to trolley wire is now getting serious, and no doubt the Committee is aware of the trolley wire snapping in various places in the town, causing irritation to the public and stoppage of the trams. I think it resolves itself into a question of policy on the part of the Committee, as to whether it will make certain of a supply.

Two of the tenderers notified that trolley wire had been shipped : the Griffin Engineering Co., and Messrs. H. Davis & Co.

As far as I am able to judge, says the manager, there is no certainty attaching to any of the other tenders, either from Japan or America, compared with the certainty of trolley wire actually having been shipped on the steamships mentioned in the case of Messrs. Davis & Co., and of the Griffin Engineering Co. Therefore, the Tramway and Lighting Committee is called upon to decide as to whether it will make certain of a supply in accordance with the tenders of Messrs. Davis and the Griffin Co., or place itself in the same position in future as obtains to-day—that is, placing orders without any certainty of getting supply.

The Council has accepted the tenders of Messrs. Davis & Co., for a total of 8,960 lb. (approximately 4 miles), at a total cost of £1,013, and the Griffin Engineering Co., for 10 miles of trolley wire, at a total cost of £2.750.

The T.C. has accepted the tender of the South African General Electric Co., for the supply of 10,000 yd. of 1 sq. in. cable, for £16,700.

As to British tenders the Committee reported :—"The difficulty of the position in reporting on British tenders is that no definite information is obtainable, and, generally speaking, one can take it for granted that there is no hope of getting copper cable from England."

Salford.—Electricity Committee. Tenders accepted :—

Four 1,666-K.V.A. transformers.—British Westinghouse E. & M. Co., Ltd., £5,460.

Glazed stoneware pipes.—Doulton & Co., £661.

York.—Electricity Committee :—

Babcock & Wilcox, Ltd.—Coal elevating plant to replace obsolete existing machinery, £1,797, plus cost of alteration and erection.

FORTHCOMING EVENTS.

Institution of Mining Engineers.—Thursday, June 13th. At 11 a.m. Annual general meeting; and on Friday, June 14th. At 10 a.m. At Burlington House, Piccadilly, W. 1.

Junior Institution of Engineers.—Friday, June 14th. At 7.30 p.m. At 39, Victoria Street, S.W. Lecturette on "Electric Accumulators," by Mr. R. Rankin.

North-Eastern Section.—Tuesday, June 11th. At 7.15 p.m. At the Mining Institute, Neville Street, Newcastle-on-Tyne. Paper on "The Applications of the Static Transformer," by Mr. S. A. Stigant.

NOTES.

How to become a Wireless Engineer.—The *Wireless World* for May contains an interesting article on this subject, intended to constitute a reply to the many inquiries received by the editor. It is stated, with reference to the practice of the Marconi Co., that great importance is attached to the character and general education of the would-be engineer, who must also have been thoroughly trained in general engineering, be from 21 to 25 years of age, and be physically fit. The range of subjects covered in his technical training has to be a very wide one, and both college and workshop training is essential.

Hull Technical College.—Hull Education Committee considered a request from the Electrical Contractors' Association (Incorporated) East Riding Branch, that they might send a representative to act on the Technical Committee of the Education Authority at Hull. The Director stated that no doubt the Committee referred to was the Advisory Committee for the Engineering, Shipbuilding, and Allied Trades. The Committee decided that the Association should be informed that their request would be favourably considered when the Advisory Committee resumed its operations.

The University of Toulouse.—A detailed description of the curriculum and equipment of the Institute of Applied Electrotechnics and Mechanics at the University of Toulouse is given in *Le Génie Civil* for April 27th. The Institute provides a thorough course of training in electrical engineering and applied mechanics, which lasts three (and in some cases four) years. The laboratories, which are equipped in an up-to-date manner, provide both for teaching and research. Special attention is given to hydraulic and internal-combustion engineering. Separate sections are devoted to technical measurements on electrical machines and accessories, static electricity and magnetic measurements, photometry, wireless telegraphy, &c. A special water tower and auxiliary plant is installed for experiments on water pressure and flow—an innovation that will prove of great value in view of the proposed extension of hydro-electric power in different parts of France.

The Employers' Parliamentary Council and the Trade Boards Bill.—The above Council has issued a Memorandum on this Bill, which gives powers to the Minister of Labour to establish Wages Boards for the fixing compulsorily of rates of wages which employers may legally pay. The Bill is an extension of the Trade Boards Act (1909), which was restricted to what were called "sweated industries," and is regarded as an attempt to fix permanently the inflated wages and artificial conditions of employment prevailing during the war. Under the principal Act, extensions could be made only by Provisional Order confirmed by Parliament, thus securing to all opponents the right of being fully heard. The present Bill transfers powers from the Board of Trade to an individual Minister, practically removes the safeguards given by the principal Act, deprives opponents of the right to be heard by Parliament against an Order, and places them at the mercy of a State Department without any power of resistance. The Employers' Parliamentary Council state that it is not aware of any reason for departure from the present course of procedure, and, therefore, urges the retention of the safeguards now existing, and submits that such a Bill should not be promoted in anticipation of the proceedings of Joint Standing Industrial Councils to be established in the several industries, among the essential functions of which will be the fixing of rates of wages to correspond with the demand for "a higher standard of comfort generally"; and it further submits that to give general powers to a State Department to trespass upon the legitimate province of these bodies, which would possess a practical knowledge of the facts and circumstances relating to the industries they represent, is unwise and harmful, and likely to be strongly resented by the Joint Councils, who will naturally be jealous of their own authority and powers. The Employers' Parliamentary Council holds that if these Joint Councils cannot be trusted harmoniously to settle such a fundamental matter as the fixing of the rate of wages without their arrangements being subject to the decisions of a Statutory Wages Board, set up possibly at the instigation of a small number of discontented persons, their prestige will be destroyed, and the scope of their operations will necessarily be seriously diminished.

Electric Cabs at the Hague.—Owing to the scarcity of petrol, a service of electric motor-cabs is about to be started at the Hague.

Volunteer Notes.—London Army Troops Companies, Volunteer Engineers.—Headquarters: Balderton Street, Grosvenor Square, W. 1.

Orders for the week ending June 15th, 1918, by Lieut.-Colonel C. B. Clay, V.D., Commanding.

Captain of the Week.—Capt. W. Darley Bentley.

Next for Duty.—Capt. E. G. Fleming.

Monday, June 10th, to Friday, June 14th.—Drills as usual.

Saturday, June 15th.—Commandant's Parade at Headquarters, 2.30 p.m., for drill in Hyde Park. Dress: Drill order with rifles.

C. Higgins, *Capt.* R.E., *Adjutant.*

Storage of Coal.—An article by S. W. Parr on "Some Developments in the Chemical Industries as a Result of War Conditions," in *Science* of April 26th, contains much interesting information; with reference to the storage of coal on a large scale the author states that a number of chemists and engineers have been at work for a number of years on this problem, and results are now available in such a form as to furnish a practical contribution to this very important problem. The summary of it all seems to be: First, that coal can be stored in large masses with a fair degree of safety from spontaneous combustion; and secondly, that the loss of heat values due to weathering or other deterioration processes is practically negligible. As confirmatory, at least, of the first of these conclusions, the case is cited of a large power and lighting concern in the U.S.A. which for some time had been putting in practice the principles involved in the proper storage of coal, and, indeed, had a very considerable stock in hand. During the recent freight embargo due to weather conditions, this company was able to continue its service without interruption by drawing upon its reserve supplies. Only an occasional truck-load of coal was received for 30 days, and what this meant to the operating end of the system may be realised when it is known that the fuel demand of the concern's boilers amounted to between 6,000 and 7,000 tons per day. There was a storage supply that was drawn upon to the extent of over 200,000 tons. The practicability of storing coals was thus strikingly demonstrated. The chemists have worked out the fundamental principles involved; it is now up to the engineers to apply them. The storage of coal having been shown to be possible, it at once becomes an industrial as well as a war measure of very great importance.

Electrical Equipment of German Aeroplanes.—Lieut. J. L. Lefranc, who described a short time ago in *La Nature* the principal types of German aeroplanes and their engines, gives in a recent number of the same journal some highly interesting particulars of the armament of these machines. With regard to the electrical equipment, he says the wireless plant comprises a generator driven by a small air screw or by the engine, a transmitter, and an aerial. A special device permits of varying the wave length and intensity of emission. The range of the set is about 30 km. (18·6 miles). Some machines are also equipped with receiving apparatus as well.

For heating purposes the German machines are equipped with electric heaters fed by the wireless generator or by a special generator. Special heating devices are also provided for keeping fluid the lubricating oils for the engine and for the machine guns when machines are flying at a great altitude. The position indicators, instrument lamps, landing signals, &c., are generally supplied by a small generator or from accumulators.

Cheap Road Transport.—A luncheon meeting of the Commercial Motor Users' Association, last Friday, was made the occasion for the inauguration of Colonel R. E. B. Crompton, C.B., as the first President of the Association. Colonel Crompton delivered his presidential address on "The Future of Heavy Motor Traffic." After dealing with gas propulsion, he said it was practically certain that further developments of accumulators would take place in the near future, which would increase their usefulness and durability, and reduce the deadweight carried.—*The Times.*

Institution and Lecture Notes.—Illuminating Engineering Society.—The report of the Council for the past session states that the Joint Committee under the Department of Scientific and Industrial Research has been continuing its work, one matter that has received special consideration being the important question of illuminating glassware.

Further work has been done by the two Committees engaged in experiments on flares and parachute lights and on luminous gunsights for a Government Department, and interim reports on both subjects have been presented. In addition, suggestions have been submitted for the consideration of the authorities with regard to such matters as economy in lighting in relation to fuel saving, lighting arrangements for air-raid shelters, and the desirability of obtaining fuller statistics on the effect of inadequate illumination in causing street accidents. Through its representatives the Society has been participating in the work of the London Safety First Council, especially the bearing of illumination on street safety.

The Society has also been considering the best means of furthering investigations on the hygienic and physiological aspects of illumination.

With the commencement of the present year "The Illuminating Engineer," the official organ of the Society, attained its tenth anniversary, and the event was celebrated by the issue of a special number of the journal, in which the progress of the illuminating engineering movement since its inception was surveyed. A large number of messages of congratulation were published, illustrating the wide interest now taken in the work of the Society, as a body of national value, with great possibilities of future development.

Fatalities.—At the residence of Mr. J. E. Tully, Hexham, his head gardener (Mr. William Bolton) was killed while attending to his duties in the greenhouse. It seems that Mr. Bolton was tying a plant to a galvanised wire, which was in contact with the electric light cable. Deceased called to the undergardener, who at once pulled him off, receiving a shock in doing so. Dr. J. A. Jackson was speedily called in, but pronounced life extinct. The deceased was 42 years of age.

British Engineering Standards Association.—The Engineering Standards Committee, as reported in our last issue, under "New Companies," has now become incorporated under the Companies' Acts, the word "limited" being omitted by licence of the Board of Trade. The Committee, therefore, is now a corporate body with a legal entity, and is thus enabled to maintain its position with regard to its brand, which has been largely used in a number of the British standard specifications. The wider use of the brand by manufacturers generally who are working to the British standards should be of material advantage to the British engineering industry throughout the world. The good work that the Committee has done during the past 17 years, and its acknowledged position in the engineering world, make its incorporation a logical sequence in its development.

Appointments Vacant.—Professor of electrical engineering (£600, with quarters); two lecturers in civil and mechanical engineering (£400, with quarters), for the Hong-Hong University; chief clerk for the Tunbridge Wells Corporation electricity works; station superintendent (£195 + 12½ per cent.) for the Eastbourne Corporation electricity works; junior switchboard attendant (29s. 6d. + 9s.) for the Rhondda U.D.C. electricity department; charge engineer (70s.) for the Wakefield Corporation electricity department; engineer-in-charge (£140 + 12½ per cent.) for the Hereford Corporation electricity works. See our advertisement pages to-day.

Linking-up in South Wales.—Whilst going to press, we have received from the hon. secretary of the Local Committee for the Linking-up of South Wales and Monmouthshire Electricity Supply Undertakings a copy of the Committee's Interim Report. The area concerned has been divided into three areas, in each of which the question of linking-up is being considered in detail.

Chief Technical Assistants' Association.—The annual social of the Association was held on Saturday last at Anderton's Hotel, Fleet Street, E.C., Mr. H. F. J. Thompson (Battersea), the chairman of the Association, presiding. The chairman said that the membership, although limited to senior technical officers, was steadily growing, and the extension of the Association to the United Kingdom had produced very gratifying results; it was anticipated that very soon a number of additional local centres would be formed in the provinces in order that country members would have the same advantages as their colleagues in London. It was not intended to be only a technical society, it had also protective objects, and engineers in electricity supply and traction undertakings, both company and municipal, who were eligible and not yet attached to any other similar society, should communicate with the hon. sec., Mr. A. P. MacAlister, 50, Eden Grove, N. 7. He hoped that the day was not far distant when, as regards the protective measures, all such Associations would join forces; but they would continue to hold their usual meetings on technical subjects.

Mr. A. P. MacAlister, honorary secretary, outlined the proposed Association of British Engineers, and hoped that all members would give it their consideration.

Electricity in Oilfield Development.—A paper on "The Application of Electrical Power to Oilfield Requirements" was read at a meeting of the Institution of Petroleum Technologists, last week, by Mr. J. Wilfred Burford, A.M.I.E.E., who stated that electrical power was extensively used for drilling, cleaning out, and pumping oil wells in the United States, especially in California and West Virginia. In the United States there were now 1,750 applications of electric motors to oil wells, aggregating 38,000 H.P. In California 100 wells had been drilled by electric power, the deepest of which reached a depth of 2,700 ft., while in West Virginia one was taken down to 3,100 ft. Of the 11,000 wells in the Baku district 27 per cent. were operated electrically, necessitating generating plant amounting to 70,000 KW. Rumania had about 200 wells electrically operated, aggregating 14,000 H.P.—*Financier.*

Decimal Coinage.—On the motion for the second reading of the Decimal Coinage Bill in the House of Lords on Tuesday, Lord Leverhulme opposed it on the ground that the new coinage should be based not upon the sovereign but on the halfpenny. The Government was unable to support the Bill, but was willing to appoint a Joint Committee to deal with it. The debate was adjourned.

British Scientific Products Exhibition.—As already announced here, the British Science Guild is organising a comprehensive Exhibition of Products and Appliances of Scientific and Industrial Interest, which prior to the war were obtained chiefly from enemy countries, but are now produced in the United Kingdom.

The Exhibition, which will be held at King's College from about the first week in August until the first week in September, will show in the first place products chiefly imported from Germany before the war, but now made in this country; but it will also illustrate the remarkable developments that have taken place generally in our scientific industries. In many of these, as a matter of fact, Great Britain always excelled, and it is only our national quality of self-depreciation which has prevented the public from appreciating the fact that we were able to export to Germany apparatus and products embodying the highest scientific knowledge and technical skill.

The general scope of the Exhibition is set forth in a preliminary leaflet which has been issued, from which it is noted that the exhibits will include:—Chemical products; thermal, electrical, and optical appliances; glass, quartz, and refractory materials; photographic apparatus and material; surgical and medical appliances; and papers and textile products.

Further particulars may be obtained from the Organising Secretary, 82, Victoria Street, London, S.W. 1.

Tramway Crane.—In the *Electric Railway Journal* of April 20th, Mr. W. H. McAloney mentions a home-made motor-operated 3-ton crane for use in the engineering department, which the Denver Tramway Co. recently turned out in its shops. The car operates very successfully, and is proving to be a big labour saver. It was recently used to advantage in handling sections of special work and temporary track made up ready for use during replacement of the special work lay-out crossing.

The car is 40 ft. long overall, 8 ft. wide, and weighs complete 53,000 lb. It is equipped with two Brill 27-E trucks and four GE-58, 37½-H P. motors, operated with a K-6 controller and auxiliary contactors. Tomlinson A1-2 couplers and Westinghouse semi-automatic air brakes are used. The car-operating cab is 15 in. above the floor, and has a receptacle on both front and back for a Golden Glow searchlight with a 94-watt lamp on main and dimmer resistance. The steel jib crane has a capacity of 3 tons and a reach of 21 ft.; the beam is 26 ft. 2 in. long, with the revolving axis 4 ft. 8 in. from one end, and stands 7 ft. 4 in. above the car floor. The crane is motor-operated, the platform being supported at the base of the drum by two 6-in. channels on the outside, and two beams of the same size channel placed back to back lengthwise in the centre of the platform and cross braced with angles. The floor of the platform is made of ¼-in. steel plate. The distance from the bottom of the crane-motor platform to the car floor is 17 in. The motor, which is a 10-H.P. Otis Elevator, compound-wound, direct-current machine, handled by an old K-10 controller, is placed in a horizontal position, and power is transmitted through bevel gears to a vertical shaft with a pinion which engages a large band gear encircling the lower part of the drum.

Combined Fuel Rations.—According to the *Daily Mail*, the combined coal, gas, and electricity rationing order will come come into force for England, Scotland, and Wales on July 1st. People who then exceed their allowance will have to pay at greatly increased rates for the excess quantity, and will be liable to have their supply cut off.

Every household of from two to twenty rooms will be rationed on the basis of about 3½ tons of coal a year for two rooms, with an extra ton for each additional room.

Of this allowance the consumer can take as much as he likes in gas (15,000 ft. for each ton of coal) or electricity (800 units for a ton of coal).

He will have to declare how he intends to apportion his year's ration in coal, gas, and electricity, and must keep to his figures.

An Electric Vehicle "Team" Attachment.—Recently there was introduced in the United States a three-wheel electric tractor unit, designed to replace a team of horses, while otherwise employing existing truck equipment. The tractor is propelled b

the forward electric wheel, and is of a length about equal to a pair of horses. The speed is approximately 50 per cent. faster than that of a team when loaded, and about 100 per cent. when running empty. This model is expected to accomplish results ordinarily achieved by two teams and drivers. The plan is to use one tractor in connection with two wagons, no change being made in wagon construction other than to remove the tongue and the whippletree, and to substitute therefor a suitable connection which will enter into the coupling at either side of the electric tractor.

It is understood that a number of these electric tractor installations are working very satisfactorily in practice.

ELECTRICAL POWER ENGINEERS' ASSOCIATION.

THE National Executive of the Association met at Birmingham on the 1st inst. Representatives of the Northern, Midland, and Southern Divisions were present, with the hon. general secretary (Mr. W. Arthur Jones). Mr. H. W. Healy was elected chairman.

At the outset it was resolved, in view of the draft proposals of the West Yorkshire Section having been received too late for the detailed consideration of the Divisional Councils, that the meeting should consider only the general lines of the rules of the Association, and only by unanimous agreement of the National Executive should these be considered binding on the members of the Association; any controversial points not agreed upon to be submitted to all Divisions existing on June 1st, for reconsideration; the further recommendations of these Divisions are to be received by the honorary general secretary on July 6th, and to be submitted and finally decided upon at the adjourned National Executive meeting to be held at Manchester on July 27th, 1918. Meanwhile, the draft rules from all sections are to be collated by the Divisional Secretaries.

It was arranged to form a Junior Section, open to pupils, apprentices, and improvers.

The Ministry of Labour, in accordance with the terms of the Whitley Report, has summoned employers and Trade Unions connected with the electricity supply industry to meet at Manchester during June to discuss the formation of an Industrial Council, and it was decided to send representatives.

The following Objects of Association were unanimously agreed upon:—

1. . . . To raise and maintain the efficiency and general status of engineers engaged in the electrical industry.
2. To act as a protective organisation on behalf of members of the Association.
3. To secure that only qualified engineers are appointed to responsible positions involving the management, direction, or control of engineering matters connected with the electrical engineering industry.
4. To secure legal certification of all qualified engineers.
5. To obtain recognition as a body of professional engineers and to ensure representation at all conferences affecting the interests of members of the Association.
6. To obtain for members the best possible conditions of employment and adequate remuneration, compatible with training, responsibility, and local conditions.
7. To ensure a maximum of six days a week of employment for all members engaged on shift duties.
8. To abolish the employment of pupils and apprentices in responsible positions, except in justifiable cases of sickness, emergency, or temporary relief.
9. To form an information and employment bureau for the general assistance of members and employers.
10. To provide legal assistance for members when necessary, so far as is allowed by law, in matters appertaining to their employment, and for securing compensation to members who suffer by accident or otherwise in their employment.
11. To promote educational and social intercourse amongst the members.
12. To uphold and maintain the absolute right of every member to determine from time to time the employer whom he shall serve.
13. To encourage and foster invention and discovery amongst members of the Association.
14. To promote the general advancement and efficiency of electric power supply and the conservation of the Empire's natural resources.
15. To encourage the members to contribute to the Electrical Trades Benevolent Institution.

The question of kindred Associations was discussed, and it was agreed that the E.P.E.A. desired the co-operation of all technical engineers engaged in the electrical industry.

It was decided to refer the question of divisional representation on the Council to all members of the Association. A vote is to be taken as to whether divisions shall be represented on the National Executive equally or proportionately to numerical strength.

The meeting adjourned until July 27th.

It will be noted with pleasure that the National Executive of the E.P.E.A., at the annual meeting reported above, while claiming in their objects of association some of the privileges of their profession, avowed their intention of also accepting some of its responsibilities. Among these, they have decided to support the Electrical Trades Benevolent Institution; their action should have far-reaching effects in making the fund better known throughout the United Kingdom and in recruiting a large number of subscribers from among staff men. We heartily commend the action of the E.P.E.A. to the notice of similar Associations, feeling sure that by following it they will be acting in the best interests of their members. Already the Hon. Publicity Secretary (Mr. G. C. Law) has forwarded to Mr. F. B. O. Hawes £8 8s., which the Association has raised for his fund by a concert, and also several subscriptions from members of the E.P.E.A. This is a very good beginning.

LONDON AND SOUTHERN DIVISION.—Owing to the increasingly large number of engineers joining the E.P.E.A., it has been found advisable to form the Southern Division into sections, and the second of these was inaugurated at a meeting held at Stratford, Essex, on the 28th ult. It was there decided that the title should be the "Eastern Section," and that the Section should include members from electricity supply stations in East London. Mr. F. Farndon was elected chairman. The hon. secretary is Mr. A. J. Giffen, of 277, Shrewsbury Road, E. 7, with whom staff electrical engineers should communicate.

A general meeting of the members in the London Division will be held on Monday, 17th inst., at 7 p.m., at St. Bride's Institute, Fleet Street, when Mr. A. C. Bostel will give an address on "Trade Unions and Incorporated Societies." The chair will be taken by Mr. C. H. Wordingham, President I.E.E.

THE ASSOCIATION OF BRITISH ELECTRICAL ENGINEERS.

ELECTRICITY SUPPLY SECTION.

ON instructions from the Council of the Institution of Electrical Engineers, the Committee of the Newcastle Local Section convened a meeting of electrical supply engineers of all ranks, whether members of the Institution or not, to discuss the formation of the proposed Association with the title given above. Mr. Marshall (chairman) said that the Institution was debarred by its constitution from taking action of a political character, and had, therefore, devoted its attention more to academic than to economic affairs. In view, however, of the strong feeling which pervaded the country that electrical engineers had not the recognition and representation which they, as a useful professional body of men, deserved in the affairs of the country, the Council had decided to give all possible support to the formation of this Section of the Association, and other Sections at the earliest opportunity. The position as regarded electrical engineers, more particularly those connected with supply undertakings, was at present most unsatisfactory. In fact, some junior men had joined the workmen's Trade Unions for protection under Military Service Acts, and others had been forced into such Unions against their will by the action of their employers. The Whitley report distinctly declared that only the views of organised bodies would receive consideration, so that, unless professional electrical engineers had an association to speak for them, they would perforce have to have incidental representation either through the employers or through the manual workers.

Mr. L. L. Robinson (Hon. Secretary of the Supply Section) stated that the urgent need for the formation of an Association for the material and personal protection of professional or administrative electrical engineers appeared to be proved by the recent organisation of several such bodies, each of which was catering for the interests of a very limited section of their colleagues. Organisations existed for those who were contented to class themselves among the ranks of the operatives, in Trade Unions such as the E.T.U. But there remained a class of engineers who could not see their way to join operatives' Trade Unions, because, although they were technically employés, they were practically employers, or, at least, confidential agents of the employers of the operatives. In the electricity supply industry he classed in this category the chief engineer and manager of an undertaking and all his engineering assistants down to and including the engineers-in-charge and the assistant engineers-in-charge. This class of engineer had at present no representative body to look after his material, personal, and individual interests. As a consequence, the social status of these engineers had been unsatisfactory, the salary often ludicrously small, and the conditions of employment leaving much to be desired.

Some Associations of the classes of administrative officers referred to had been inaugurated. The chief objection to them was that they were small and not sufficiently influential. It had therefore been suggested that a new body should be formed to be called "The Association of British Electrical Engineers," which would be charged with the duty of looking after the material and individual interests of all administrative electrical engineers. This idea had met with the hearty approval and support of the President and Council of the Institution of Electrical Engineers, and it was hoped that the two bodies might be able to work in close co-operation. It had been decided that this new Association should be registered as a Trade Union, to bring it into line with the recommendations of the Whitley Reports. The general scheme was that the Association should consist of a number of sections, *e.g.*:—

Section 1.—Electricity Supply Engineers.
Section 2.—Electrical Plant Manufacturers' Engineers.
Section 3.—Electrical Contractors' Engineers, &c.

Each Section would have its own Council, and each Council would have representation upon the Grand Council of the Association. Such an Association backed by the I.E.E. should arrive quickly at a position of great strength and influence, and should

be able to bring considerable pressure to bear whenever necessary in order to secure that qualified men were preferred and employed at satisfactory salaries. Their aim should be to make the profession of electrical engineering as much respected as the legal or medical profession, and equally closely guarded.

It had been proposed that the Electricity Supply Engineers' Section of the Association should be composed of Members and Associate Members having the following qualifications:—

Members.—Members shall be engaged in the business of electricity supply, and shall be corporate members of the Institution of Electrical Engineers.

Associate Members.—Associate members shall be persons of good general education engaged in the business of electricity supply, and they shall have had at least one year's training at an approved technical college, or two years' apprenticeship in an approved firm, company, or corporation, or shall have been engaged in an electricity supply undertaking in a responsible technical position for at least two years.

No more detail had been decided upon at present. It was felt that the best procedure would be to get the matter talked over at each Local Section, and afterwards to call a mass meeting in London.

He believed Mr. Wordingham would be good enough to act as first president, which would ensure that the Association would be launched with a good skipper at the helm.

Mr. H. W. Clothier said that he attended the meeting of the Council in London on Thursday last week, and that meeting unanimously supported this movement. The question whether the Association should be registered as a Trade Union had been fully considered, and it was agreed that the Association should be registered under the Trade Union Act, not only for the purpose of putting it on a proper legal footing on lines similar to other Associations, such, for instance, as the Cable Manufacturers, but it was also essential that it should be so registered in order to give it the necessary authority and status in connection with the steps taken by the Government in the reconstruction of industries.

Mr. Wordingham was conferring with the officials of the E.P.E.A. with a view to incorporating that enterprise with the work of the Committee which Mr. Robinson represented. There was vital necessity for unity.

General discussion followed, and after Mr. Robinson had replied to questions, it was unanimously resolved:—

"That this meeting of electricity supply engineers of Newcastle and district, promoted by the Newcastle Local Section of the Institution of Electrical Engineers, supports the formation of an Association of British Electrical Engineers, and appoints delegates to represent it at a mass meeting to be held in London under the chairmanship of the President of the Institution of Electrical Engineers."

The following delegates were appointed:—Messrs. W. T. Dalton, J. Cusworth, C. Vernier, M. F. Sheedy, H. S. Ellis, P. S. Thompson.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station and Tramway Officials.—The Hull Tramways electrical engineer, Mr. J. WILKINSON, who recently received a letter from the Controller of Coal Mines appointing him district engineer in connection with the coal economy campaign, cannot accept the post owing to his state of health. With the approval of the Committee, he nominated Mr. R. G. ELLIOTT to take up the work.

At the Northampton T.C. the tramways manager reported that Mr. W. E. OWEN, superintendent at the power station, had resigned, but before filling the position he was making application to the military authorities for the release of Mr. E. Jordan—former power station superintendent—who had been passed by the military as fit for home service only. The Committee approved of the action of the manager.

Leeds E.C. has made the following re-arrangement of staff:—Mr. T. Went to be manager of the meter and stoves department and superintendent of meter inspectors, at £350 per annum; Mr. E. H. Leask to be superintendent of sales and furnaces departments, at £320 per annum; Mr. E. H. Halliwell to be assistant superintendent of meter inspectors, at £170 per annum.

The Bournemouth E.C. has re-affirmed its former recommendation as follows:—"That a bonus of 1 per cent. on the net profits for the year be granted to the general manager and the assistant manager—four-fifths thereof to the general manager and one-fifth to the assistant manager. This bonus to be regarded as in respect of the work of the year covered by the report."

The Tunbridge Wells Council has unanimously decided to increase the salary of the borough electrical engineer, Mr. R. N. TORPY, by £100 per annum.

The Leicester T.C. on Tuesday raised the salary of Mr. T. R. SMITH, the chief electrical engineer, from £900 to £1,000 per annum. The War Bonus Committee, in their report, stated that the officials of the electric supply department were in most cases entitled, under the provisions of Sir George Askwith's award, to their salaries, war bonus, and 12½ per cent. The circumstances were peculiar, and the Committee recognised that the Tramways Committee, in making the recommendations contained in the previous report, were actuated by a desire to adjust matters as far as practicable. The Committee made the following recommendations upon the understanding that the salaries in question would be re-adjusted upon the declaration of peace, and also subject to all the officials concerned making no claim of any war bonus or other war payment now obtaining, or which may obtain during the war:—W. BARTON, resident engineer, Aylestone station, £325 to £425; T. TYSON, resident engineer, Lero station, £300 to £396; H. E. ROGERS, mains superintendent, £225 to £312; E. J. RILEY, chief clerk, £228 to £320; J. BARKER, electrical assistant, £223 to £309; G. MORRIS, car sheds superintendent, £285 to £380; H. POOL, accountant, £301 to £350.

General.—Mr. HARRISON BARROW, Chairman of the Birmingham Tramways Committee (and a prominent member of the Society of Friends), has been sentenced to six months' imprisonment for an offence under the Government Regulations by being a party, as acting-chairman of the Friends' Service Committee, to the printing and publication of a leaflet, "A Challenge to Militarism," without mentioning on it the name of the author, or submitting copies to the Press Bureau. Notice of appeal was given, and Mr. Harrison Barrow was allowed bail. He has since resigned his public work in Birmingham pending the re-trial.

At the Hull Education Committee, the Director of the Technical College reported that in response to the advertisement for a lecturer in electrical engineering to be attached to the mechanical engineering side, three applications had been received, and Mr. P. L. Bernstein, of the College of Technology, Manchester, who had been invited to attend that meeting, was the only suitable candidate. It was stated that Mr. Bernstein's parents were of Dutch nationality, and came from South Africa, and that he was a Grade 3 man. After Mr. Bernstein had been interviewed, it was decided to appoint him at £175 per annum, rising to a maximum of £250 per annum, plus the usual payments for evening classes.

Birthday Honours.—We are sure that the numerous friends and admirers of Mr. T. O. CALLENDER, managing director of Callender's Cable & Construction Co., Ltd., will desire to join with us in heartily congratulating him upon the honour conferred upon him in the King's Birthday Honours. Mr. Callender, who has been a J.P. for Kent since 1915, becomes a Knight, in recognition of his "active leadership in local patriotic work," says the *Times*, but readers of these pages will regard the honour as most fittingly bestowed upon him as one of the leaders of an important section of British electrical industry. Such honours fall so sparingly to our representative electro-industrialists that when they do come for sterling merit, as in this case, the whole profession and industry basks temporarily in the sunshine of Royal favour. Some of the outstanding qualities of Sir Thomas Octavius, and the strength of character that has contributed so much to the building up of his own reputation and the success of Callender's Cable Co. were referred to in these pages on the occasion of the celebration of his silver wedding.

Mr. GUY CALTHROP, who has so successfully filled the office of Controller of Coal Mines during the past year and more, receives the honour of Baronetcy.

Sir CHARLES PETRIE, a former Lord Mayor of Liverpool, and a man of great distinction in the public life of that city, also becomes a Baronet.

Sir E. A. GOULDING, Bart., M.P., who is made a Privy Councillor, is a director of the British Westinghouse Electric and Manufacturing Co., Ltd., and of the Westminster Electric Supply Corporation, Ltd.

Roll of Honour.—Sergeant NORMAN FAIRALL, son of Mr. G. W. Fairall, electrical engineer, of Wolverhampton, has been awarded the Military Medal. Sergeant Fairall, prior to the war, was on the electrical staff of the India-Rubber Co., Silvertown, and he joined the Forces at Sydney, Australia. He was wounded in October, 1917.

NORMAN GRIPPER, attached as a driver to the Friends' Ambulance Unit of the British Red Cross under the French Army, has been killed in action, aged 21. Prior to enlistment he was on the staff of the Blackburn Corporation electricity works.

Corporal S. MYATT, Northumberland Fusiliers, who has fallen in action, was an employé of Messrs. Siemens Bros., of Stafford.

Private S. PAGE, who enlisted from the works of Messrs. Callender's Cable Co., has died of wounds.

Company-Sergeant-Major G. H. WILLIAMS, King's Liverpool Regiment, who has fallen in action, was on the staff of the Herne Bay Gas & Electricity Co.

The Blackpool Tramways Committee has decided to make a grant of £500 for endowing a cot at the Victoria Hospital in memory of the late Lieutenant STANLEY BOUGHEY, V.C., of Blackpool, who lost his life under heroic circumstances during the fighting which led to the capture of Jerusalem.

Sapper A. H. MOREY, of the Royal Engineers, an employé of Messrs. Alex. Hawkins & Sons, of Southwark, has been awarded the Military Medal for gallantry in action.

Rifleman J. MCGOVERN, Queen's Westminster Rifles, who was in the electricity department of the Ilford U.D.C., has been wounded.

The Military Medal for gallantry has been awarded to Lance-Corporal S. Burton, R.E., who was at the Bexhill-on-Sea Corporation electricity works.

Private H. Hardy, Northumberland Fusiliers, formerly an electrician with Messrs. Pilkington Bros., Ltd., of St. Helens, who was recently reported killed, is a prisoner of war.

Bombardier H. Archer, R.F.A., killed by a shell explosion, was an electrician at the power house of Messrs. Dorman and Co., of Stafford.

First Air-Mechanic F. Suthurst, R.A.F., killed in action, aged 25, was formerly engaged in the electrical department of Messrs. Kelsall & Kemp, Ltd., woollen manufacturers, Rochdale.

Gunner G. F. Evers, who has died of wounds, was employed by Messrs. Charles Macintosh & Co., Ltd., Manchester.

Second-Lieutenant N. J. V. Crowther, R.G.A., who has been seriously wounded in France, was an electrical engineer at Messrs. Vickers' works at Sheffield.

Private C. J. Humphreys has been missing since April 24th. Before the war he was employed at the electrical laboratory, South Parks Road, Oxford.

Lieutenant W. W. Tweedy, R.E., who was for some years with Messrs. James Gordon & Co., of London, W.C., as chief engineer in their sales department, died last week in France of wounds received in the recent fighting. Lieutenant Tweedy was a native of Kendal.

The *Times* states that Lieutenant-Colonel D. H. Hyde-Thomson, who was killed while flying in Kent on May 21st, passed from Clifton College into the Royal Navy. After a brief period of sea time, he joined H.M.S. *Vernon*, and qualified as a lieutenant (T). "He joined the Royal Naval Air Service during 1914, and was associated with the early experimental work. During the war he spent brief periods at Dunkirk and in the Mediterranean, and the rest of the time was employed at the Admiralty and Air Ministry on important work. Latterly his energy was devoted chiefly to wireless telegraphy and electrical matters, in which branch the loss of his services will be greatly felt."

Chief Engineer Lyons, R.N., who was on the staff of the Hull Corporation tramways department, has been awarded the D.S.M. for conspicuous gallantry and devotion to duty during naval operations in the Irish Sea. He is now convalescent after being in hospital with wounds.

Corporal J. N. Atkinson, 31/M.G.C., previously reported wounded and missing, has written home saying that he is wounded and a prisoner of war at Altdamm, Pomern, being very kindly treated. Corporal Atkinson was taking the four years' course at the B.T.H. Co., Rugby, prior to enlisting in the H.A.C.

Lance-Corporal F. Woods, London Regiment, late of the India-Rubber Co., Silvertown, died of wounds in France on or about May 14th. Private L. North, London Regiment, formerly in the general office of the same company, is a prisoner of war in Germany.

Obituary.—Herr. H. Bissnger.—The death is announced from Munich, at the age of 61 years, of Herr. H. Bissnger, for many years Technical Director of the Electricitats Gesellschaft vormals Schuckert & Co., of Nuremburg.

Mrs. A. H. E. Padley.—We regret to hear from Mr. F. S. Grogan that Mrs. A. H. E. Padley, late chief lady demonstrator, St. Marylebone electric supply kitchens, died at Loughborough on Thursday last week. Mrs. Padley, who was well known in electric cooking circles, wrote many valuable articles on electric cooking, and made a number of useful suggestions upon the design of cooking apparatus.

NEW COMPANIES REGISTERED.

Monometer Manufacturing Co. (1918), Ltd. (150,557).—Private company. Registered May 28th. Capital, £16,000 in £1 shares (15,000 8 per cent. cum. pref.). To take over the business of engineers, &c., lately carried on by the Monometer Manufacturing Co., Ltd., at Birmingham, and to carry on the business of mechanical, hydraulic, electrical, and general engineers, watch and clock makers, manufacturers of and dealers in printing, typesetting, and type casting machinery, manufacturers of monometers, pyrometers, thermometers, heat regulators, and other apparatus, &c. Agreement with H. J. Thomas. The subscribers (each with one pref. share) are:—H. J. Thomas, 130, Bute Street, Cardiff, stockbroker; W. H. Gould, Vulcan Foundry, Bute Docks, Cardiff, engineer. The first directors are: H. J. Thomas and W. H. Gould. Qualification, £500. Solicitor: H. T. Cox, 31, High Street, Cardiff.

Waste Utilisation, Ltd. (150,573)—Private company. Registered May 29th. Capital, £1,000 in £1 shares. To utilise waste products of all kinds, and to carry on the business of agricultural, mechanical, electrical, gas, and general engineers, &c. The subscribers (each with one share) are:—H. C. Hobbins, 4, Broad Street Place, E.C., chartered accountant; W. A. Ward-Jones, 7, Queen Street, E.C. 4, solicitor. The first directors are not named. Solicitors: Mawby, Mawby & Morris, 7, Queen Street, E.C. 4.

Metallurgists, Ltd. (150,599).—Private company. Registered May 31st. Capital, £12,000 in 6,000 7½ per cent. tax free participating preference shares of £1 each, 5,000 ordinary shares of £1 each, and 10,000 deferred shares of 2s. each. To carry on any business in connection with processes for depositing metals on internal-combustion engines and manufacturing such engines and their component parts, &c., and to adopt an agreement between Sherard Cowper-Coles and J. Porter. The subscribers (each with one ord. share) are:—Sherard Cowper-Coles, Sunbury-on-Thames, metallurgist; J. M. Cobbam, 33, Southampton Street, W.C. 2, solicitor. The first directors are: Sherard Cowper-Coles (technical director) and Gustave E. de Brunner (administrative director). Qualification: £100. Registered office: 35, Long Acre, W.C. 2.

CITY NOTES.

Industrial and General Trust, Ltd.

In the course of his speech at the annual meeting, Sir George Touche, M.P., in referring to the question of national reconstruction, said he hoped that in the future the commercial expert would no longer be ignored in the equipment of our foreign Embassies and Legations. He added that although the old attitude of indifference to the development of the nation's industries was breaking down, it still lingered in some quarters. This was illustrated by the recent fate of the Water Power Bill promoted by the British Aluminium Co., whose development they had assisted financially in times past. Owing to the opposition of a few Scottish Peers and their friends the Bill had been temporarily withdrawn, although it was regarded favourably by the Board of Trade and the Ministry of Munitions. The fuller development of what the war had proved to be an essential industry had thus been delayed. The scheme would have submerged only a few hundred acres of inferior deer-grazing land and marshy ground. On the other hand, it would have supported a new village of from 6,000 to 8,000 people, helped to develop a key industry, given permanent employment under healthy conditions, and, if authorised now, would have been ready to absorb labour during the difficult period of demobilisation. Yet it was being hung up indefinitely on grounds largely sentimental and wholly reactionary.

Shanghai Electric Construction Co., Ltd.

At the annual meeting, held last week, Sir Alfred Dent said that the available balance was £70,014, against £49,509 last year. They had not yet agreed the amount of excess profits duty for 1917, but anticipated a portion of the carry-forward reserved for this purpose would be available for the 1918 account. They had again converted the profits at the rate of 2s. to the dollar, so that the first portion of the profit and loss account, which recorded transactions in Shanghai, formed a true basis for comparing one year with another, and reflected the actual progress of the undertaking. By far the greater part of the profits had been remitted home, and the profit on exchange, amounting to £17,852 as against £1,810 in the preceding year, was shown as a separate item, and represented the benefit which the company had derived from the rise in the value of silver. This method of accounting was important, since it distinguished clearly between the two main causes of the prosperity which the company enjoyed last year.

In regard to road maintenance, the arrangement with the Municipal Council had been confirmed by the ratepayers, under which the company's entire obligation was commuted by an annual payment of Tls. 16,500, which included a fixed amount to cover future increase in wear and tear. The amount was subject to revision every ten years so far as the actual cost of wages and materials might call for variation in either direction. It was well that their liability for road maintenance, which in course of time would have included the cost of replacement, was now ascertained and defined by a mutually satisfactory agreement which would also effectively prevent the question again becoming the subject of troublesome discussion between the Council and the company. The unclaimed dividends, amounting to £22,140, represented moneys held back on account of Continental friends to whom they could not remit under present circumstances. The company was under no legal obligation to allow interest, but it had had the use of this money, and as it did not wish to make a profit out of the misfortunes of its shareholders resident abroad, they had under the circumstances credited them with interest, £1,062.

The financial position of the company had materially improved, and there was every reason to believe this progress would be maintained; the result of working for the first four months of 1918 (a comparatively slack time in their receipts) being estimated to show a profit of about £175,000.

As regarded the railless service, to which they attached much importance, they were still in negotiation with the Council, and hoped soon to get sanction to carry out at least part of the comprehensive scheme that they had laid before them. The advantages of this mode of traction were obvious as against the permanent rail, and it had certainly been much appreciated by the public and by owners of property along the short distances now in working. The Native staff, which consisted of six different nationalities, numbers 1,220; they had worked with increased efficiency and a complete freedom from labour troubles. Last year they carried nearly 73½ millions of passengers and covered a distance of over four million miles.

Great credit was due to Mr. McColl for his able work and administration under the trying circumstances of a depleted staff and increased cost of all materials.

Calcutta Electric Supply Corpn., Ltd.

At the annual meeting of this company the Chairman said that the capital expenditure during the year had been very small, owing to restrictions on the supply of materials, and this to a considerable extent had prevented any large expansion of the system. After referring to the causes of increase in revenue expenditure, the chairman said that the carry forward was less than for 1916, chiefly due to the provision for excess profits duty, but it was still larger than would be necessary in normal times. The need for providing for unexpected demands in

war time made it expedient to keep a substantial sum in hand. They had been enforced to curtail their supply owing to the necessity for economising boiler power, and the impossibility of obtaining sufficient bitumen and other materials for carrying out extensions. They had now been advised that their coal contracts had been cancelled, and that they would have to make shift with whatever amount and quality of coal the contractors were permitted to deliver. A 10-year contract with the Government had been practically settled for the supply of current to an extension of their Ordnance Factory at Cossipore, which adjoined their generating station. Their requirements would probably reach about 1,600 KW. A scheme had been approved for gradually changing sections of their overhead mains to underground, with a view to diminishing the chance of breakdown from falling trees, &c., during storms, but owing to lack of material the carrying out of the work had had to be postponed. This principle of replacing overhead by underground mains was one which they considered of great importance, and they proposed to keep it constantly in view. It foreshadowed considerable expenditure in future years. They had been fortunate enough to get delivery of a repaired rotor belonging to one of their generating sets, which rotor, but for the war, would have been delivered during 1914. The costs incurred for freight and insurance had been extremely heavy, but it completed their available plant capacity to 21,800 KW. In regard to the question of their charges to the public for electric current, at the last meeting he announced their intention of reducing the then effective flat rate of 4 annas for combined light and power consumption to one which was 3¾ annas, and he told them that the cost to them of this seemingly small reduction in rate was estimated to be between £12,000 and £14,000 in a full year of operation. This estimate was very carefully made, but it was based on a census of their consumers taken in 1912. They had since obtained a new census of the 1917 consumers, and found the somewhat amazing fact that consumers of no less than nearly 2,000,000 domestic power units, and over 3½ million light units who might have benefited during the last half of 1917 by the reduced rate had failed to do so. The money which the consumers might have saved themselves in a full year was about £12,000, excluding meter rents. Consumers of about ¾ million units who had taken advantage of the new rate had profited by some £1,600 during the half-year. The estimate of their anticipated loss of revenue was quite accurate, and it was not their fault that the benefits offered had not been fully taken advantage of by the public. There was still some grumbling among a limited section of the Calcutta public at their rates, and a curious anomaly arose of people cavilling at rates and yet failing, to the great extent indicated above, to take advantages offered. During the four years ended December 31st, 1917, the public had benefited by reductions of charges for lightng to the extent of at least £57,000. In the face of the figures, it was surprising that anyone could be found to suggest that the company had not dealt fairly in sharing its prosperity with its consumers. The company's action in reducing rates had, so far, been justified by results, but further development in this direction was greatly hampered by the "fog of war," which must continue to affect them in a marked degree, and obscured the data upon which to base calculations. They had to face increased cost of plant, freight, and insurance. They were faced, too, with reduced output owing to steps necessarily taken by the Government to restrict coal consumption. The increased cost of living and the general rise in wages had caused additional expenditure, and pointed to further outlay to come. They would, therefore, readily understand that relinquishment of revenue at the present time, when almost every supply undertaking similar to theirs was increasing its charges, was a measure very closely to be examined. The reduction of revenue to which they were liable on account of the 3¾ annas flat rate, if fully taken advantage of, was £12,000 to £14,000, and the additional reduction of revenue due to a 3½ annas rate was estimated to be £6,500, approximately half of which would fall on the year 1918 if such a rate commenced on July 1st. After very full and anxious consideration they had decided, in continuation of their policy of associating shareholders and consumers in the success of their undertaking, to increase the dividend on the ordinary shares by ½ per cent.—from 9½ to 10 per cent.—for the year 1917, and at the same time they had authorised their agent to announce a reduction in the scale of combined flat rate for lighting and domenstic power to 5 annas, with an immediate rebate of 1½ annas, under the usual conditions, that was a 3¼ annas flat rate to all who chose to avail themselves of it. This rate would apply to consumers of 60,000 units or less per annum; for larger consumers further rebates would continue to be given as at present. They had revised all salaries from January this year at a cost of £2,600 in 1918, and a pension fund was to be inaugurated with £7,500. It was an opportune moment to start this fund when they chanced to be making a very considerable profit by Exchange.

Marconi Wireless Telegraph Co. of America.—A financial daily states that a dividend of 25 cents per share of $5 is announced.

France.—La Compagnie Générale de Télégraphie sans Fil is the name of a new company which has lately been formed in Paris, with a capital of £500,000.

Peel-Conner Telephone Works, Ltd.—For the year ended March 31st, 1918, the net profit was £22,902, out of which £10,000 has been put to reserve, leaving £12,902, plus £5,188 brought forward. The preference dividend for the year absorbs £5,000, and a dividend of 2s. per share on the ordinary shares, free of tax, requires £8,000, leaving £5,090 to be carried forward. The result of the year's trading has been satisfactory, which is largely due to Government contracts reverting, to a considerable extent, to the company's standard work.

Brotherton Tubes and Conduits, Ltd.—The report for the year ended March 31st shows a trading profit of £15,266. After adding transfer fees and deducting depreciation, interest, directors' fees, &c., and adding £6,771 brought forward, a balance of £19,793 remains. The directors recommend a dividend of 1s. per share, less tax, and to carry forward (subject to excess profits duty) £17,355.—*Financial Times.*

Doulton & Co., Ltd.—After paying the preference dividend for 1916, £51,203 remains, which the directors propose to carry forward.

United River Plate Telephone Co., Ltd.—Final dividend, 5 per cent. on the ordinary capital, making 8 per cent. for the year, free of income-tax, carrying forward £17,307.

Western Telegraph Co., Ltd.—Third quarterly interim dividend of 3s. per share, free of income-tax, for the year ending June 30th, 1918, being at the rate of 6 per cent. per annum.

Canadian General Electric Co., Ltd.—Quarterly dividend 2 per cent. to June 30th.

La Plata Electric Tramways, Ltd.—After paying debenture interest, £10,359 remains, and it is to be carried forward.

STOCKS AND SHARES.

Tuesday Evening.

The principal feature of the past week in the markets devoted to electricity issues has been the publication of the report of the Select Committee appointed by the Government for considering the whole question of electric supply throughout the country. The Committee's recommendations are certainly sweeping. They cover an extremely wide ground, ground so wide, in fact, that the recommendations are regarded in the Stock Exchange as being outside the pale of practical politics, at any rate until the war is over. The markets in the shares have hardly varied to the amount of an eighth, and those who should be in a position to understand what is likely to be the effect of bringing into operation such a scheme with regard to electricity supply companies are fain to admit that they cannot see their way to express any useful opinion as things are now. Had a scheme on a smaller scale been suggested, and one capable of being put into working order in spite of the increasing difficulties that surround the whole question of man-power, there would probably have been some reflection of the proposals to be seen in market quotations, but, as already noted, the idea is considered to be too vague, large, and nebulous to bring it into view as a practical prospect.

The principal rise in the electricity markets is a jump of 17½ points in Brush Electric Ordinary stocks, raising the price from 42½ to the neighbourhood of 60. This came about as the result of a declaration by the company of dividends for 1916 and 1917 on the ordinary stock of 6 per cent. per annum. That something favourable was in the wind there had been previous hints, and, as we mentioned last week, the quotation of 40 to 45 was misleading, inasmuch as a seller could have placed his holding at the higher figure, but it is doubtful whether, even at the present advanced price, a buyer would be able to pick up much stock if he wanted to do so.

Investment of the War Loan money is the outstanding feature in the gilt-edged departments around the House, and this has continued to exercise a strengthening effect upon good-class debenture and preference issues amongst industrials. Business on the whole remains very quiet, and a good deal more interest for the City man centres around Conduit Street than Throgmorton Street. Dealers in some of the telegraph and cable shares complain humorously of the lack of consideration shown by shareholders in the companies, who decline to realise their shares, and thus to create business in the market, which at present is impossible in consequence of the fact that there are many more buyers than sellers. Even to accommodate the Stock Exchange, however, it may be doubted whether proprietors should part with such excellent investments at the present time.

Further rises have taken place in the market for cable stocks. Eastern Extensions, Westerns, Eastern Ordinary, Indo-European, Cuba Submarines are all higher. Some buyers go further afield, and are trying to pick up West India and Panama first and second preference shares, which certainly look cheap at 8½ and 67½ respectively, in view of the prosperity attendant upon the cable industry as a whole. The American group is quiet, with no particular feature. The United River Plate Telephone Co. has declared a dividend of 5 per cent., making 8 per cent. free of tax for the year, which

is the same as that of the previous 12 months, and the price has risen 3s. 9d. Chile Telephones are 10s. higher. Marconi issues are quiet, even to stagnation, and, as usual in such conditions, the tendency is to let prices sag away. Henley's and Callender's are both a good market, and the same description applies to various others in this particular section.

General Electric Ordinary are 10s. up at 20¼. British Aluminiums have recovered a small fraction. Edisons are quiet at 2¼. Yorkshire (West Riding) Electric Ordinary spurted 5s. to 22s. 6d. London & Suburban Traction Preference are better at 6s. 9d., and the "A" debenture at 79½.

Anglo-Argentine Tramways are a good spot, the first preference rising 3/16 to £3, and there being buyers about at the price. Mexican Light & Power Common gained 2½, although the first mortgage bonds are a point lower at 37½. British Columbia Electric Deferred continued its rise, Rio Tramways Firsts advanced to 88½, and other issues in the foreign division are distinctly steady. The home railway market is undecided, with Districts ¼ up at 15, on fare-raising possibilities, and Underground Income "A" gaining a few pence at 5s., while, on the other hand, Metropolitan Consolidated receded to 20½. Business in home railway stocks is still of the minute order, but the market is fairly well maintained in sympathy with the strength of gilt-edged issues.

The engineering group is a little dull. Babcock & Wilcox have receded to 3 5/16. Chemicals are quiet, with no change in Castner-Kellner. Amongst armament shares, Vickers have improved to two guineas. The rubber market is depressed, because of a further fall in the price of the raw stuff, while amongst metal shares, those in the tin division attract a little attention.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1917.	Price June 4, 1918.	Rise or fall this week.	Yield p.c.
HOME ELECTRICITY COMPANIES.					
Brompton Ordinary	9	10	8⅞	—	£7 8 0
Charing Cross Ordinary	5	4	8½	—	6 8 1
do. do. do. 4½ Pref.	4½	4½	3⅝	—	6 18 6
Chelsea	8	5	8	—	8 6 8
City of London	8	8	11⅜	— ¼	6 13 2
do. do. 6 per cent. Pref.	6	6	9¼	—	6 0 4
County of London	7	7	10⅜	—	6 13 4
do. 6 per cent. Pref.	6	6	9¼	—	6 0 4
Kensington Ordinary	6	7	8½	— ¼	6 13 4
London Electric	Nil	Nil	1⅛	—	Nil
do. do. 6 per cent. Pref.	4	5	8½	—	7 13 10
Metropolitan	8	4	8¼	—	6 8 1
do. 4½ per cent. Pref.	4½	4½	8¼	—	6 13 4
St. James' and Pall Mall	8	9	7	—	6 8 4
South London	5	5	2⅞	—	7 2 4
South Metropolitan Pref.	7	7	21/-	—	6 13 4
Westminster Ordinary	7	9	6½	—	7 3 10
TELEGRAPHS AND TELEPHONES.					
Anglo-Am. Tel. Pref.	6	6	94	—	6 7 8
do. Def.	1½	1½	22	—	6 14 10
Chile Telephone	8	—	83	+ ½	4 17 0
Cuba Sub. Ord.	7	7	94	+ ½	*7 8 7
Eastern Extension	8	8	126	+ ½	*5 4 0
Eastern Tel. Ord.	8	8	157½	+2	*5 1 5
Globe Tel. and T. Ord.	7	—	14½	+ ⅛	*4 16 0
do. Pref.	6	6	10	—	6 0 0
Great Northern Tel.	24	22	93	—	5 15 9
Indo-European	13	—	49	+ ½	6 12 8
Marconi	15	—	8¾	—	4 17 10
Oriental Telephone Ord.	10	—	4⅞	—	3 7 9
United R. Plate Tel.	8	8	77/8	+ 7/8	*5 11 4
West India and Pan.	6d.	9d.	1⅛	—	*2 6 8
Western Telegraph	8	8	11½	+ ⅛	*5 1 5
HOME RAILS.					
Central London, Ord. Assented	4	4	62½	—	6 8 0
Metropolitan	1	1	20½	— ¼	4 17 5
do. District	Nil	Nil	15	+ ¼	Nil
Underground Electric Ordinary	Nil	Nil	1⅜	—	Nil
do. do. "A"	Nil	Nil	5/-	—	Nil
do. do. Income	6	4	76½	— ½	*5 4 7
FOREIGN TRAMS, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	42	—	6 6 4
Anglo-Arg. Trams, First Pref.	5½	5½	3	+ 3/16	—
do. 2nd Pref.	5½	—	2¼	—	—
do. 5 Deb.	5	5	63xd	—	7 18 10
Brazil Tractions	—	—	48	—	—
Bombay Electric Pref.	6	6	94	—	6 6 4
British Columbia Elec. Rly. Pfce.	5	5	60½	—	8 5 4
do. do. Preferred	Nil	Nil	42½	—	Nil
do. do. Deferred	Nil	Nil	25	+1	Nil
do. do. Deb.	4½	4½	69	−1	6 15 0
Mexico Trams 5 per cent. Bonds	Nil	Nil	37½	—	Nil
do. 6 per cent. Bonds	Nil	Nil	80	—	Nil
Mexican Light Common	Nil	Nil	2½	+2½	Nil
do. Pref.	Nil	Nil	26½	—	Nil
do. 1st Bonds	Nil	Nil	37½	−1	—
MANUFACTURING COMPANIES.					
Babcock & Wilcox	15	15	3 5/16xd	— 1/16	4 10 8
British Aluminium Ord.	10	10	19½	+ 7/16	5 0 10
British Insulated Ord.	20	20	82	—	5 5 8
British Westinghouse Pref.	7½	7½	2⅞	—	6 9 4
Callenders	20	—	17½	+ ½	5 16 0
do. 5 Pref.	5	5	4	—	6 5 0
Castner-Kellner	22	20	3 5/16xd	—	6 0 10
Edison Swan, fully paid	—	—	2¼	—	Nil
do. do. 4 per cent. Deb.	4	4	76⅝	—	5 6 0
Electric Construction	7½	10	1⅜	—	7 12 4
Gen. Elec. Pref.	6	6	10½	—	5 15 8
do. Ord.	10	10	20½	+ ¼	4 16 5
Henley	25	25	20½	+ ½	6 0 6
do. 4½ Pref.	4½	4½	3½	—	6 12 2
India-Rubber	12	12	11⅜	—	*8 8 0
Telegraph Con.	20	20	42½	—	*5 18 0

* Dividends paid free of income-tax.

MARKET QUOTATIONS.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general, and they may vary according to quantities and other circumstances.

Wednesday, June 5th.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec.
a Acid, Oxalic	per lb.	1/6	..
a Ammoniac Sal	per ton	£80	..
a Ammonia, Muriate (large crystal)	"	£75	..
a Bisulphide of Carbon	"	..	..
a Borax	"	£43	..
a Copper Sulphate	"	£57 10/-	..
a Potash, Chlorate	per lb.	2/6	..
a " Perchlorate	"	2/-	..
a Shellac	per cwt.	£16 15/-	15/- dec.
a Sulphate of Magnesia	per ton	£15	..
a Sulphur, Sublimed Flowers	"	£35	..
a " Lump	"	£26	..
a Soda, Chlorate	per lb.	1/1	..
a " Crystals	per ton	£70/-	..
a Sodium Bichromate, casks	per lb.	..	..
METALS, &c.			
c Brass (rolled metal 9" to 12" basis)	per lb.	..	..
c " Tubes (solid drawn)	"	..	..
c " Wire, basis	"	..	..
c Copper Tubes (solid drawn)	"	1/7 to 1/7½	..
g " Bars (best selected)	per ton	£147	..
g " Sheet	"	£147	..
g " Rod	"	£147	..
d " (Electrolytic) Bars	"	£135	..
d " " Sheets	"	£152	..
d " " Wire Rods	"	£133	..
d " " H.C. Wire	per lb.	1/4	..
f Ebonite Rod	"	8/-	..
f " Sheet	"	2/6	..
n German Silver Wire	"	2/6	3d. inc.
h Gutta-percha, fine	"	6/10	..
h India-rubber, Para fine	"	9/1	2d. dec.
i Iron Pig (Cleveland warrants)	per ton	Nom.	..
l " Wire, galv. No. 8, P.O. qual.	"	£42	..
g Lead, English Pig	"	..	..
g Mercury	per bot.	Nom.	..
e Mica (in original cases) small	per lb.	6d. to 2/-	..
e " " " medium	"	2/6 to 6/-	..
e " " " large	"	7/6 to 14/- & up.	..
d Silicium Bronze Wire	per lb.	1/8½	..
r Steel, Magnet, in bars	per ton	..	..
g Tin, Block (English)	"	..	..
n " Wire, Nos. 1 to 16	per lb.	4/6	..

Quotations supplied by—

a G. Boor & Co.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
r W. F. Dennis & Co.

City and Guilds Institute.—Sir Edward Busk, presiding at the annual meeting of the City and Guilds of London Institute, said that a considerable amount of research work had been carried out, partly to continue previous investigations and partly in new directions. In the department of technology 8,905 candidates were examined, as against 10,184 in the preceding year.—*The Times.*

Additions to the Commonwealth Edison Plant.—No better evidence of the difficulty of keeping pace with the demand of a great and rapidly growing city can be found than in the description of some of the new work at the Northwest station of the Commonwealth Edison Co. in the *Electrical World* of May 4th. The first plant contained two 20,000-KW. units, to which have now been added three 30,000-KW. turbo-generators and one of 35,000 KW., the last-named for 25-cycle operation like the original plant. When in full operation the station will be able to furnish 85,000 KW. at 25 cycles and 80,000 KW. at 60 cycles. To provide for this immense output corresponding changes have been necessary in the boiler room. Each of the first two machines of 20,000 KW. was fitted with 10 boilers per set. The last generators, in spite of their greatly increased rating, have only five double boilers each. This change is an impressive demonstration of the tendency towards getting boiler units somewhere nearly commensurate with the generator capacity.

The additions to the plant have also involved a general change from steam to electric drive for all the auxiliaries, a change thoroughly in keeping with the general trend of practice for obtaining higher efficiency and greater convenience. All the new units are equipped with direct-connected exciters, and the circuits are so connected that each unit can be fully controlled from its own particular panel. They are all, too, equipped with control relays which are somewhat unusual in the thoroughness of the operations conducted by them. When tripped they act in succession to open the main generator switches, the generator field switch, the generator neutral switch, and the ventilating-fan switch in the case of the machines which have artificial ventilation. Exploring coils installed in the generators are connected to temperature indicators in the operating gallery, and similar coils in the air intakes of the machines give continuous indications of the temperatures reached in operation. Interesting details regarding the arrangement of the switchboard connections and apparatus in the plant are included.

THE INSTITUTION OF ELECTRICAL ENGINEERS.

The annual general meeting of the Institution was held on Thursday last week. The President, Mr. C. H. Wordingham, introduced the report of the Council with a running commentary, in the course of which he emphasised the importance of developing the social and commercial sides of the Institution, as well as the scientific side. The code of regulations for the electrical equipment of ships, he said, had made good progress, and would be published in the late summer or early autumn in a form handy for the pocket. Regarding the Board of Trade report on electricity supply, issued that day, he said that the position taken up by the Council, which had given evidence before the Committee per Mr. C. P. Sparks, at that time President, had been thoroughly justified by the event. A reference to the metric system in the report required some explanation: The Engineering Standards Committee had given permission to the sectional committees to employ the metric system for the dimensions of their standards if the respective industries so desired; but although the electrical manufacturers wished to adopt this course, difficulties were met with owing to the unavoidable occurrence of inch and metric measures on the same drawing. The E.S.C. therefore asked the electrical industry to state definitely what it wanted—should the fundamental dimensions be standardised in even figures on the metric or the inch scale? The Council called a conference at which the Institution, the B.E.A.M.A., the C.M.A., T.L.A., and the B.M.A. were represented, the discussion being confined to one narrow issue—whether the E.S.C. specifications should continue to have the fundamental dimensions in even British units, or whether they should now be made metric. The conference decided that the present was not an appropriate time to make the change, but that the metric equivalents might be given in addition to the inch measurements. The President briefly outlined the system which was being gradually built up by the Engineering Training Organisation, and described the prompt action that was taken by the Council in connection with the order for reducing the consumption of electricity, which action had exercised a material influence on the decisions of the Fuel Controller. He concluded by remarking that the Benevolent Fund did not receive sufficient applications for relief, and therefore could not make an effective appeal to the members for support.

Seconding the motion to adopt the report, Mr. C. P. Sparks said that its contents bore witness to the immense amount of work that had been done by the President himself.

Mr. H. Boot drew attention to the peremptory order issued by the Controller of Munitions Mineral Oil Production to users of Diesel engines, requiring them to adapt their engines for the consumption of tar oils by March 31st—three weeks' notice—and said that the device recommended by the Controller had been tried on a plant with which he was concerned, but had proved a failure, and involved the company in considerable expense.—The President stated that the I.E.E. Committee had had nothing at all to do with the recommendation in question.

Mr. Boot further protested against the indiscriminate order for a reduction in the use of electricity, advocating a system of rationing by the number of rooms or occupants, and the President said the same views had been strongly urged by the Committee of the I.E.E. Lastly, Mr. Boot said the members owed a debt of gratitude to Mr. Wordingham for developing the social and business sides of the Institution.

Mr. H. Allcock regretted the manner in which the Council had dealt with the metric system in the report; the Institution had officially advocated the general adoption of the system in this country, and he thought that some such explanatory statement as the President had made should be inserted. It was, of course, unreasonable to expect the I.E.E. or any other body to isolate itself by adopting the metric system before it came into general use.—In reply, the President pointed out that the conference included other bodies besides the Institution.

Mr. E. C. Barton considered that it was a very serious matter; the meeting of the I.E.E. which discussed the subject was almost unanimously in favour of the general adoption of the metric system—not, of course, its sectional adoption—and he thought an explanation should be added to the statement in the report.—The President replied that manufacturers and traders were conspicuously absent from the meeting; it was essentially a commercial matter, and the Institution *must* consult the bodies immediately interested in it. The persistence of old units in metric countries had nothing to do with the real point at issue, which was the adoption of the metric system in engineering. The meeting referred to was intensely disappointing, and afforded no definite guidance to the Council.

Mr. E. T. Williams pointed out that a great deal of criticism was directed at the Institution in the past, but this was no longer the case. He had been grieved in the past to see qualified men holding aloof from the Institution or dropping their membership; the time had now come when every qualified man should join the Institution, as a duty, and individual members should use the power at their command in filling appointments to make membership of the Institution a qualification of considerable importance.

Mr. G. Semenza said that the Italian Electrotechnical Association was also drawing up rules for the electrical equipment of ships, and suggested international agreement on the subject. With regard to the metric system, in Italy everybody desired that English trade should supplant that of Germany, but for this purpose the adoption of the metric system was essential. It was a matter of the highest importance.—The President, in reply, said he was extremely pleased to have Mr. Semenza present (the local hon. secretary of the Institution in Italy), and the Committee would welcome the collaboration of the Italian Association. A small committee would be set up to watch all these international relations and to secure joint action.

Mr. S. Evershed commented on the absence of criticism nowadays, in contrast with the experience of past years. The Institution was a living, growing organism, and the Council entirely changed its attitude because the members had changed theirs. While he did not object to the commercial side, he wished to see the scientific side of the Institution developed, because manufacturers needed boosting on that side lest they should be outdone after the war.—The President agreed, and announced that the Council was taking active steps to develop the scientific side of the Institution.

Mr. P. M. Baker said that the reference to the metric system in the report might be quoted as a precedent, and urged that an explanatory note should be added. Plain members might have ideas serviceable to the various committees, and some channel of communication should be provided.—The President pointed out that members could write to the Secretary, and on Mr. Allcock's suggestion agreed that when new committees were formed an invitation to members to send in ideas should be inserted in the *Journal*.

The report was then adopted unanimously, and Mr. J. E. Kingsbury, moving the adoption of the accounts, said that the increase of membership and of subscriptions was very gratifying at such a time as the present. Expenditure had increased but little in spite of the high costs, and this year there was a balance to the good on the building. They could not expect to get as much for their money in the future as in the past, and therefore the Council had put £3,000 to reserve, a new feature in the accounts.

Few comments were made, and the accounts were adopted unanimously. Votes of thanks were afterwards accorded to the Institution of Civil Engineers, and the honorary officers of the Institution.

THE FARADAY SOCIETY.

General Discussion on "The Co-ordination of Scientific Publication."

A discussion on this subject, opened by the President, Sir Robert Hadfield, Bart., F.R.S., was held on May 7th at the rooms of the Chemical Society, Burlington House, W. Among those who took part were Prof. A. Schuster (Secretary of the Royal Society), Mr. M. Longridge (President of the Institution of Mechanical Engineers), Mr. C. H. Wordingham (President of the Institution of Electrical Engineers), Mr. Robert Mond, Mr. W. R. Cooper (editor of *The Electrician*), Mr. L. Pendred (editor of *The Engineer*), Mr. Edgar Worthington (Secretary of the Institution of Mechanical Engineers), Mr. G. Shaw Scott (Secretary of the Institute of Metals), Dr. C. E. Keane, Mr. F. S. Spiers (Secretary of the Faraday Society), and Messrs. Pearce, P. Peakman, and Wright. Written communications were received from Prof. R. C. Gregory (editor of *Nature*), Dr. C. H. Tripp, Dr. P. E. Spielmann, and Dr. J. O. Tunstall.

The discussion ranged from suggestions for preventing overlapping in the reading and publication of papers and the preparation of abstracts to consideration of a great central housing and library scheme for all the principal scientific and engineering societies, after the manner of the United Engineering Societies' building in New York, a striking photograph of which was shown by the President. It may be long before the big scheme comes into being, but, in the meantime, numerous practical and helpful suggestions were made which, if carried out, will enable the distracted man of science to find out what is going on in his own little corner of work, as well as in the greater sphere of knowledge, with a minimum of time and effort. Fortunately, the Conjoint Board of Scientific Societies was well represented at the meeting, and some of the ideas put forward will doubtless find a fruitful soil for development in that very excellent and necessary body. Indeed, one or two speakers favoured the notion of all papers being submitted to that or some other central body, and thence allocated to the separate societies, but little favour was given to this bold idea, the adoption of which, it was thought, would tend to stifle the individuality of the societies. All speakers, however, heartily supported the suggestion that the Board should publish a weekly bulletin of all papers to be read or published by the affiliated bodies, and that facilities for free intercourse should exist between the societies, so that meetings should be thrown upon wide to all and sundry. The policy of joint meetings for the discussion of "borderland" subjects was also widely advocated. One speaker made the practical suggestion that secretaries

should consult one another systematically, when drawing up their programmes, as a means towards co-ordination and co-operation. The logical conclusion of this idea, the creation of a "secretary of secretaries," with, perhaps, a special President and Council, was also put forward in course of debate.

A very feasible method of facilitating co-ordination was to publish all journals of societies in a uniform size and type, and to issue reprints of all papers at a nominal charge to members of any Society. This is a reform that the Conjoint Board might well attempt to carry out. The systematic production of text-books or monographs, under the guidance of the Board, or of the Department of Scientific and Industrial Research, and the multiplication of really high-class special technical journals were other means which found favour for co-ordinating the vast stores of scientific knowledge and data constantly being accumulated, and for presenting them in a form readily available for swift assimilation.

Several speakers dwelt on the present unsatisfactory position as regards the production and publication of abstracts. The overlapping in this work is positively absurd. For example, abstracts of one branch or other of chemistry and chemical technology are at present being published by no less than some half-dozen societies. There is no reason why the whole matter of abstracting should not be in the hands of one central body—either the Conjoint Board or an *ad hoc* creation. The abstracts should be issued in sections, for any of which members of the affiliated societies should be entitled to subscribe at a nominal figure. One contributor thought that abstracting should even be internationalised, every country being responsible for the abstracts in its own tongue, as well as for translating those supplied by other countries.

Other suggestions worthy of consideration centred round the idea of amalgamating, or, at any rate, uniting much more closely than obtains at present, the present great and ever-growing number of special societies. It was admitted by nearly everybody that the need for specialised societies is a real one, and their value very pronounced, but there was every reason why groups of societies dealing with cognate subjects should co-operate closely, sharing the same building, pooling libraries, and granting special inter-society privileges to the members of all the units in the group. Sir Robert Hadfield and others went even further in advocating one great central building and library for all the great technical societies, like the house in New York already referred to. Sir Robert also instanced, in support of his scheme, the recently-formed German federation of six prominent technical associations, comprising a membership of some 60,000 technical experts. Certainly from many points of view, particularly in the facilities it would give for cataloguing and indexing on a really comprehensive scale, such a scheme would have great merits, and yet it was felt by many that such centralisation could go too far, and could become crushing—German-like—in its efficiency. Groups of societies and big sectional libraries, repeated as far as possible in the important provincial centres, is a solution of the problem not only in many respects more attractive, but also far easier of realisation, and if the discussion will have the effect of stimulating to greater activity a tendency already manifest, it will have served a truly useful purpose.

THE DEVELOPMENT OF THE BRITISH DYE-MAKING INDUSTRY.

One of the first results of the outbreak of hostilities between the United Kingdom and Germany was a forcible realisation of the fact that the great textile trades of this country were mainly dependent on German sources of supply for the colouring matters which are essential to those industries, and so important are the textile trades in British industry, and so vital to them is a supply of dyestuffs, that it was necessary for the Government to consider what steps should be taken to deal with the difficulties which had arisen. A committee representing the dye-consuming industries was appointed to consult with the Board of Trade, and, as a result of its deliberations, a scheme was prepared for the co-operation of the Government with the dye-users in an attempt to rid the industries of the menace which had been overshadowing them. This scheme provided for the formation of a limited liability company, with a proportion of Government advanced capital, with the object of re-establishing the synthetic dyestuff industry in this country. The Government agreed to make advances up to £1,500,000 on a mortgage debenture, and the company was authorised to raise £3,000,000 ordinary share capital, to be obtained from consumers of dyestuffs. The new company, with the style of "British Dyes, Ltd.," proceeded to allotment on April 1st, 1915, with an issue of one million £1 ordinary shares.

The company availed itself of the agreement made between the Board of Trade and a dye-making company in the North of England, and acquired the undertaking of that firm, and utilised the works of that undertaking as a nucleus for development. It was ultimately decided to acquire land in the immediate neighbourhood of the existing works, and various estates of a total area of nearly 500 acres were purchased. The general lay-out of the works embraces all the best principles of modern factory practice, and should enable the company to manufacture its products under the best conditions.

The manufacturers outside Germany were generally content to manufacture finished dyestuffs from imported German intermediate products. It was by holding a virtual monopoly in intermediate product manufacture that the Germans really controlled the dyestuff manufacturing operations of the whole world, and so long as they retain that monopoly no non-German firm will be free from aggression. The company, therefore, adopted the policy of developing as far as possible, the manufacture of intermediate products in Great Britain. An analysis of official statistics disclosed the existence of about 100 intermediate products of prime importance. Large plants for the manufacture of these substances have been designed and erected, and the company is at the moment manufacturing many intermediate products on a commercial scale. A very long series of processes are frequently necessary for the production of one intermediate product. It has been estimated that, of the capital to be expended by a dyestuff manufacturing company, for plant for dealing with coal tar products only, about 85 per cent. will be represented by intermediate product plant.

A dye-making factory requires not only the necessary chemical plant, but also large installations for providing services of high and low-pressure steam, electricity, power gas, compressed air, &c., and in the company's works are to be found large boiler houses, a central electric generating station, a Mond gas plant, &c. This type of construction has been very difficult to carry out under present conditions, but the provision of such services is essential.

A dye manufacturing company also requires for its operations large quantities of certain of the heavier chemicals, more particularly mineral acids. As supplies of such acids in this country were required for the manufacture of munitions of war, it was necessary that the company should erect its own plant for the production of these essential commodities. Consequently, the new works contain large plants for the manufacture of oleum and nitric acid.

In connection with the design of new plant, it has been found necessary to conduct a considerable amount of chemical research, and difficulties have been experienced by the company in securing an adequate supply of trained assistants to carry on this work as well as for manufacturing operations. Organic chemistry was only studied to a very limited extent before the war in Great Britain, and the services of chemists with organic training were largely required in munition factories. The company has managed to secure over 100 trained chemists, but it will be necessary greatly to increase this number, and certain educational schemes are now being developed. Arrangements were made with the University of Leeds for the company's chemists to attend, at its expense, a course of lectures on a branch of the chemistry of dyemaking. It has also been arranged with a local technical college, to which the company has given £5,000, that young assistants shall attend part time to receive chemical instruction. A much larger scheme is now being considered by a Committee of the Board.

The power-house, situated at the Dalton works, contains two 2,000-kw., 50-cycle, 3-phase, 3,000-r.p.m., 3,000-amp. per terminal Westinghouse turbo-generator sets, with provision for a third and larger set in the near future. The switchboards, switchgear, instruments, transformers, &c., are all of Westinghouse make. The whole of both the old Turnbridge and the new Dalton works are electrically lighted and motor-driven throughout, power at 3,000 and 400 volts being used with lighting to neutral. A large number of small motors are also used in the different laboratories. An underground ring main is ordinarily in use, but an overhead network is also provided as a stand-by in case of emergencies.

The present boiler system comprises 15 30 ft. by 8 ft. 6 in. Lancashire boilers. These are fitted with Hodgkinson coking stokers, Ronald Twist automatic feed-regulators and superheaters. The superheaters are by-passed to enable saturated steam to be supplied to the gas producers. Weir steam pumps are used throughout. All coal and ash is mechanically handled.

There are in course of erection six Stirling water-tube boilers, each of an actual evaporation of 25,000 lb. of water per hour at 200 lb. per sq. in. and 200 deg. superheat. These will be fitted with the Underfeed Stoker Co.'s forced-draught chain-grate stokers, induced-draught fans, and Crosby automatic feed-regulators. The coal and ash handling plant will be of Babcock & Wilcox make, the latter being of the suction type. Each boiler will be an independent unit having its own economiser of the standard "Green" type.

A boiler house to accommodate 16 30 ft. by 8 ft. 6 in. Lancashire boilers is in course of erection, to supply steam at 160 lb. per sq. in., which will be used for process work only, and will have only sufficient superheat to prevent condensation in the tubes.

In addition to the above plant, two similar batteries of boilers will be installed in other parts of the works. As far as possible the boiler houses will be standardised. Lancashire boilers are found to be particularly suitable for process work. This will be readily understood when it is considered that in one process alone the demand for steam may vary from nothing to 75,000 lb. per hour in 30 minutes. At the old works 24 Lancashire boilers are in commission; these are fitted with Bennis, Triumph, and Proctor stokers.

The power station contains two 2,000-KW., 3,000-volt, 50-cycle, 3-phase Westinghouse turbo-alternators with Heenan and Froude filters; two 1,250-KW. Westinghouse oil-cooled step-down transformers, 3,000 to 400 volts.; a 9-panel H.T. 3,000-volt cabinet type switchboard; and a 13-panel L.T. 400-volt board. Merz-Price protection on generator and transformer panels, overload on H.T. feeders, and parallel feeder protection on L.T. feeders is provided.

The steam turbines are constructed to work as pass-out machines, which enables steam at 30 lb. per sq. in. pressure to be available for process work, this arrangement giving a maximum thermal efficiency.

The condensers are of the plain jet type, water being taken from a local stream for cooling purposes. The installing of a further 5,000-KW. set is under consideration; this will be mounted over a standard surface condenser, water being supplied for cooling purposes by means of cooling towers. This new plant is urgently needed. It is interesting to note that the load factor is as high as 80 per cent., which compares very favourably with any other power station in the country. The overall cost of electricity is also very low.

The electrical system is 3,000 volts H.T., 3-phase, 50 cycles, stepped down to 400 volts L.T., 3-phase, 50 cycles, for works supply, and a 3,000-volt, 6-conductor, .25-sq. in. overhead line to step-down switchgear at Turnbridge, one and a half miles distant. The motors are 400-volt, 3-phase; lighting is at 232 volts, between phase and neutral. The H.T. generator neutrals are earthed direct, and the L.T. system is earthed direct at the power station and sub-station respectively.

The compressed-air plant, supplying air at 75 lb. per sq. in. to the works, consists of three electrically-driven belt-drive compressors, each capable of compressing 1,000 cu. ft. of free air per minute to a pressure of 80 lb. per sq. in, and two steam-driven compressors by Belliss & Morcom, each capable of compressing 1,000 cu. ft. of free air per minute to 80 lb. pressure. The exhaust steam from these sets is used in the gas producers.

The ice plant consists of four belt-driven compressors, two with 100-H.P. motors, and two with 45-H.P. motors. These are capable of making 60 tons of ice per day, and also pumping 24,000 gallons of brine at 32 deg. per hour. In the near future the size of this plant is to be doubled.

Distribution to date is effected at 400 volts from the power station and sub-station; 3 and 4-core paper-lead-covered cable is used, some armoured and laid direct, other plain lead in Sykes conduits. 300-ampere multiway Fluvent fuseboards of Parmiter, Hope & Sugden manufacture are installed as main distribution boards in each shed. At the Dalton works a radial system of L.T. paper-lead cables drawn into conduits has been adopted to feed the various sheds. An overhead ring main runs round the area, and is teed into each shed as a stand-by supply, and to equalise the load on the underground cables. Merz-Price protection is provided on the overhead ring main. The load on the system consists almost entirely of induction motors and lighting, with the exception of cooking installations at the canteen and chemists' club. The motor switchgear in all cases is totally enclosed, and provided with wiping glands to receive lead-covered cables.

The motors installed number about 400, aggregating 5,500 H.P., and there are about 5,000 lighting points. The generating station has an output of 10,000,000 units per annum.

CONFERENCE OF ELECTRICAL INSPECTORS OF INDIA.

FROM *Indian Engineering* of April 13th we abstract the following account of the proceedings of the third conference of Electrical Inspectors and Electrical Engineers to the Indian Government:—

Representations were made by the Electric Supply and Traction Federation of India, the Bombay Chamber of Commerce in conjunction with the Bombay Fire Insurance Agents' Association, and the local Electrical Contractors.

The main points brought forward by the Electric Supply and Traction Federation of India were:—

1. The obligation on the part of licensees to give a large supply to Government at a very low rate resulted in the public having to pay an enhanced rate in the same area, and thus it did not tend to stimulate industrial development in the area.

2. The local Government and local authority should undertake to support the undertaking from the commencement with a guarantee either of 5 per cent. interest or of a guaranteed larger consumption at a rate of supply not more than 10 per cent. below those fixed for general supply; and that when the supply company had paid dividends averaging 7 per cent. on its capital the surplus should be divided between the guaranteeing parties and the shareholders in the proportion of the guarantors' demand and the public demand for the past year. This arrangement to continue up to the time that the supply company paid 10½ per cent. on its capital after providing for depreciation, &c., when the local Government should be entitled to demand a reduction in the rates to all consumers, so as to bring the dividends down to an estimated 7 per cent. again, when the same process of dividing surpluses would again continue.

3. The necessity of allowing each electrical inspector more discretion and authority to relax rules, and the establishment of a Court of Appeal to which licensees might apply in the event of an inspector giving a decision which the licensee considered unreasonable.

The deputation from the Bombay Fire Insurance Association, the Bombay Chamber of Commerce, and the British Cable Makers brought forward two points, one being the labelling of wires and cables, and the other the registration of wiremen and wiring rules. The deputation urged on the conference the necessity of advising the Government of India to introduce such legislation as might be necessary to make it compulsory that all wires and cables imported into India should have a sealed label giving the manufacturer's name, and details of the size, grade, and class of wire, and also that it should bear some distinguishing marks to make it possible to identify any wire or cable after it had been fixed in position. The deputation recommended to the consideration of the conference the necessity of having one set of wiring rules, and the registration or licensing of all wiremen and electricians. They pointed out some of the main defects commonly found in installations which were due to inferior workmanship.

The deputation of Electrical Contractors brought up a minor point regarding the importation of foreign fans.

The report of the conference dealt with questions of law and interpretation, and amendments to the Indian Electricity Act, 1910; the Indian Electricity Rules, 1911; the "Model Form of Conditions, Rates, and General Information for the Supply of Electrical Energy" which had been previously circulated by the Government of India to all local Governments and licensees, inviting criticisms and suggestions; the Model Wiring Specification which was drafted early in 1917, and which was circulated to all members of the conference, the Electric Supply and Traction Federation, and the Calcutta Local Centre of the Institution of Electrical Engineers; and technical papers read by members of the conference. On the whole, the report contains very little of importance; the points raised by the Electric Supply and Traction Federation of India form the bulk of the discussions.

As regards the licensing or registration of wiremen, the conference and the Federation agreed that action on the general lines of the reports of the meetings in 1916-17 should be taken in each province, industrial facilities in the way of classes being the main requirement as a preliminary to certificating or licensing. It was mentioned that in Madras such classes had been instituted by the Director of Industries. The rules relating to the grant of certificates are printed in an appendix to the report. The standard required is high, and is a move towards eliminating "jerry-wiring."

Two papers were read by Mr. Meares, one entitled "Notes on Indoor Illumination," and the other "Types of Ceiling Fans, with Effective Area and Consumption." A paper on "Ferro-Concrete Poles" was read by Mr. Greenwood.

MR. DUDLEY DOCKER AND THE ELECTRICAL INDUSTRY.

THE Metropolitan Carriage, Wagon, and Finance Co., Ltd., held its annual meeting at Birmingham, at which it was resolved to increase the capital of the company to £10,675,000 by the creation of 7,000,000 new ordinary shares of £1 each. We make the following extracts from an important speech delivered by Mr. F. Dudley Docker, C.B., the chairman:—

I told you last year that we had embarked on electrical business, and that we had purchased from the Americans the control of the British Westinghouse Co. You will, I know, agree that the electrical trade is a "key industry," and to be successful it must be organised on broad and sound lines. In the past it has been almost entirely controlled by other nations, and that because there were too many competing interests in this country, each suffering from insufficient equipment. It is our intention to strain every nerve and to use to the full the resources of brains and capital to build up this industry. We are certain it will not only be to the ultimate good of the shareholders, but a matter of considerable importance to the country itself. In pursuing this enterprise we feel that we are helping the whole of our national commerce, and as we are in a position to do so, we have no hesitation in asking you to be generous in your support, to take the broad view, and to study the national as well as our individual interest.

I am convinced that upon electrical enterprise rests the fate of nearly every industry in the country, and I do not doubt that in various degrees our policy will have the support of the whole commercial world. After the war we shall have the keenest competition from Germany, and I have had some particulars taken out as to the amount of money spent on research in the past by our enemies, and I think I am right in saying that it is almost, if not quite, in excess of the whole of the dividends ever paid in this country by the whole of our electrical industries. It is our intention to have a research department that shall be second to none in the world. We mean to cast our bread upon the waters, and we hope for a reward that will not be too long delayed. To strengthen the position we have entered into an alliance with Messrs. Vickers who will share with us in our electrical work. In addition we have recently acquired large interests in the South Metropolitan Electric

Light and Power Co. and the West Kent Power Co., both of which have areas ripe for development.

I would remind you that your company has in the past devoted a vast amount of time and attention to the electrification of railways. The provision of equipment other than the actual construction of the necessary rolling stock has always been a difficult one. The enterprises in which we have acquired interests will enable your company to undertake the whole work of electrifying a railway, even to supplying the power. This is a great step forward, as in the past some of this work had to be shared with the foreigner.

At the outbreak of war the manufacture of glass bulbs for electric lamps had been almost exclusively done abroad. I am glad to say that, in conjunction with the General Electric Co., we have agreed to purchase the British rights in special machines for making these glass bulbs, and we hope soon to have the first machine installed and at work, when Great Britain will be independent, as far, at any rate, as the manufacture of these bulbs is concerned. We do not, however, seek to establish any monopoly, but will be ready to grant licences on favourable terms to any British firms. The chief object of our developments has been to ensure self-support to this country in trade and business that in the past has been, in some degree, controlled by other nations. I want you to lay hold of this fact, and I am happy to say that others, too, are looking ahead in the hope that when our long-delayed victory in the battlefield is crowned by a lasting peace, we shall be found ready to take our proper position in the industrial competition that is certain to follow, and hold a winning place.

You will remember that from time to time I have drawn the attention of the public to the imperative necessity of amalgamations and combinations, and I have been glad to see in recent times much progress in this direction. That combination of large firms like the Workington Iron Co., Steel, Peech & Tozer, Frodingham, Samuel Fox & Co., and others, is, to my mind, all to the good. Some people have given voice to their fears that these amalgamations are merely a creation of trusts, which in time secure monopolies to the detriment of the public weal. I have no such fears, and, within reasonable limits, I am wholly in favour of combining competing interests. I think the success of this company is a standing tribute to the wisdom of amalgamation carried out on sound lines. I willingly concede that it is quite right to discourage the creation of monopolies, but that is a very different thing from the combining of persons in particular trades, to do away with such throat-cutting competition among themselves as leaves them—good, simple folk—an easy prey to the foreigner, and forces them to cut down the wages paid to their own employés. You must remember, above all, that it is with Germany we shall principally have to compete after the war; that in Germany the policy of combination has been reduced to a fine art, and that it is against Germany in particular that your board intend to wage implacable war until the conditions that stifled British trade in the past have been rendered impossible of revival. I emphatically declare that amalgamations and combinations aiming at the elimination of unfair home competition and its consequences are entitled to, and may well demand, support in the interest of the British race. These combinations not only secure trade to the nation, but also provide abundant supplies to the public of the articles they want of a good quality, and at a lower cost. In addition, they ensure a fair profit for the partners, and, what is more, good wages to be paid to the workmen. If we are going to keep our place in the markets of the world we must be strong, and strength can only be gained by combination of effort and resources. Let us, then, help ourselves; let us shake off our shackles and strengthen our muscles, and then when we have to compete with our rivals the country must see to it that we get, as of right from our Government, abundant Imperial support in a definite and organised manner, and not in the sporadic and haphazard fashion that has paralysed our efforts in the past.

Two years ago I mentioned to you the formation of the Federation of British Industries. At that time I told you we had among its members a number of influential firms, but that we wanted a thousand. I am happy to tell you that we are well on the way to that thousand, as the latest return that I have seen shows that the membership, including trade associations, was between 800 and 900. I am glad to tell you that this Federation is consulted by various Government Departments, and I believe, as time goes on, it will have great weight in all deliberations on trade affairs. I do hope that other firms will, sooner or later—and the sooner the better—become members, for, though we may have differences of opinion, we are all out for the one big thing, and that is the British side; and we can only accomplish results by being united and by ventilating whatever grievances we may have one with the other before going out to battle. This Federation should have far reaching benefits for every member of the trading community.

Insulating Material from Fish Offal.—A new Danish process by which certain by-products, valuable for electrical insulation, may be made out of fish offal, is soon to be put to practical test in Skagen, Denmark. The most important of the new products is called "cornimit," and a factory known by that name is now being erected. It is claimed for "cornimit" that it excels galalith as an electrical insulating material. It is said to have less water-absorbing ability, as well as a larger insulating resistance. The price of the finished product is calculated at 11d. per kilo (5d. a lb.).—*U.S. Commerce Reports.*

NEW PATENTS APPLIED FOR, 1918.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. SEFTON-JONES, O'DELL AND STEPHENS (successors to W. P. Thompson & Co., of London), Chartered Patent Agents, 285, High Holborn, London, W.C. 1.

8,372. "Electric ignition tube or plug." J. W. PATTERSON. May 21st.

8,381. "Means of igniting charge of liquid fuel in internal-combustion engines." E. H. SALMON & J. R. WASS. May 21st.

8,382. "Ventilation and cooling of dynamo-electric machines." C. W. MAJOR. May 21st.

8,396. "Magnetic healing apparatus." S. MAESHIMA. May 21st.

8,397. "Apparatus for military telegraphy to avoid overhearing by listening apparatus." A. MACARTAIR. May 21st.

8,447. "Support for telephone receivers." A. E. FORD. May 21st.

8,476. "Electric arc welding systems." T. G. MCKAY & H. POLLOCK. May 21st.

8,492. "Electro-magnetic clutches." W. LANGDON-DAVIES & A. SOAMES. May 22nd.

8,505. "Electric lampholders." A. H. SHORT. May 22nd.

8,509. "Electric furnaces." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) May 23nd.

8,529. "Apparatus for electrical separation of substances in suspension in gaseous or fluid media." SOC. GALLOT ET CIE & SOC. POUSSIN RONDEUX ET CIE. May 22nd. (France, May 23nd, 1917.)

8,538. "Apparatus for regulating strength of electric currents for medical purposes." M. NICOLETIS. May 22nd.

8,573. "Protective devices for electric circuits." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) May 23rd.

8,547. "Electric motor control." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) May 23rd.

8,581. "Trolley heads for electric tramways, &c." J. G. SMALL, A. G. H. THATCHER, AND WADKIN, MILLS & CO. May 23rd.

8,607. "Electric hand-lamps." J. BEIN. May 24th.

8,621. "Direct-current and dynamo-electric machines." B. J. SHILLITO AND H. WALLWORK & CO. May 24th.

8,623. "Apparatus for measuring and indicating electricity supply." L. R. LESTER. May 24th.

8,639. "Electric induction apparatus." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) May 24th.

8,640. "Electric conductors." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) May 24th.

8,644. "Dynamo-electric couplings." A. GOSSWEILER. May 24th. (Germany, May 29th, 1917.)

8,646. "Shade carriers." C. G. M. BENNETT. May 24th.

8,664. "Multiple telegraphy." F. J. MACKENZIE. May 24th.

8,669. "Telegraphy." J. S. WITHERS (K. C. COX). May 24th.

8,699. "Condensers for magnetos." A. H. MIDGLEY & C. A. VANDERVELL AND CO. May 25th.

8,702. "Sparking plugs for explosion engines." SOC. CERAMICA RICHARD-GINORI. May 25th. (Italy, August 10th, 1917.)

8,707. "Gas and electricity economiser." J. WILLIAMS. May 25th.

PUBLISHED SPECIFICATIONS.

The numbers in parenthesis are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1916.

18,388. INDUCTION FURNACES. Ajax Metal Co. January 24th, 1916. (103,645.)

1917.

1,588. ELECTRIC FURNACES, AND TRANSFORMERS FOR USE THEREWITH. British Electric Transformer Co. & F. E. Berry. January 31st, 1917. (115,247.)

1,674. ELECTRIC FURNACES FOR MELTING OR REFINING NON-FERROUS ALLOYS. V. C. Faulkner. February 2nd, 1917. (115,248.)

4,341. X-RAY LOCALISATION. J. M. Davidson. March 26th, 1917. (Cognate application, 10,325/17.) (115,251.)

6,132. ELECTRIC CUT-OUT OR PROTECTIVE ARRANGEMENTS FOR ELECTRICAL SYSTEMS. W. J. John & J. John. May 1st, 1917. (115,263.)

6,349. COMBINED ELECTRIC SWITCHES AND COUPLINGS. W. Donovan & G. O. Donovan. May 4th, 1917. (Cognate application, 8,585/17.) (115,275.)

6,530. ELECTRIC CABLES CONTAINING SEVERAL CONDUCTORS. Pirelli & Co. June 28th, 1916. (108,464.)

6,542. ELECTRICAL SIGNALLING SYSTEMS. Sterling Telephone & Electric Co. F. G. Bell & W. C. Davey. May 8th, 1917. (155,280.)

7,185. ELECTRICAL CONDENSERS. Dubilier Electrical Syndicate. May 2nd, 1916. (107,002.)

7,191. ELECTRIC MOTOR CONTROL SYSTEMS. W. Brooke. May 18th, 1917. (115,301.)

8,300. SWITCH-CONTROLLING MEANS FOR ELECTRIC LAMPHOLDERS AND LIKE COUPLING DEVICES. G. St. J. Day. June 11th, 1917. (115,318.)

8,318. ELECTRICAL SWITCH APPARATUS. E. Goldston & E. W. Wood. June 11th, 1917. (115,129.)

9,759. MACHINES FOR COVERING WIRES AND THE LIKE. C. J. Beaver & E. A. Claremont. July 5th, 1917. (115,331.)

9,811. MULTIPOLAR MAGNETOS FOR ELECTRIC IGNITION SYSTEMS. W. J. Mellersh-Jackson (Bosch Magneto Co.). July 6th, 1917. (115,147.)

9,953. PROTECTIVE DEVICES FOR USE IN SYSTEMS OF ELECTRIC DISTRIBUTION. British Thomson-Houston Co. (General Electric Co., U.S.A.) July 10th, 1917. (115,334.)

12,473. ELECTRIC BELLS. E. A. Graham. August 30th, 1917. (115,173.)

14,171. THERMAL CIRCUIT CLOSERS. A. M. de S. Greaves. October 1st, 1917. (114,975.)

14,286. PROCESS FOR THE ELECTRO-DEPOSITION OF BASE METALS. A. A. Lockwood. October 3rd, 1917. (114,976.)

15,272. GLASSWARE FOR ILLUMINATING PURPOSES. Holophane, Ltd. (Holophane Glass Co., U.S.A.) October 20th, 1917. (115,370.)

15,419. ELECTRICAL SWITCHES, FUSIBLE CUT-OUTS AND THE LIKE. V. G. Middleton & C. J. Baker. October 23rd, 1917. (115,373.)

15,815. ELECTRIC ACCUMULATORS. H. Dean & Chloride Electrical Storage Co. October 30th, 1917. (115,374.)

16,008. ELECTRIC TRANSMISSION OF MUSIC. M. Tocchio. November 2nd, 1917. (114,987.)

16,074. PRISMATIC GLASSWARE FOR ILLUMINATING PURPOSES. Holophane, Ltd. (Holophane Glass Co., U.S.A.) November 3rd, 1917. (114,988.)

16,265. DISTRIBUTORS FOR MAGNETO-ELECTRIC MACHINES. British Thomson-Houston Co., A. P. Young & H. W. H. Warren. November 7th, 1917. (115,375.)

16,279. SYSTEM OF ELECTRIC REGULATION FOR VARIABLE-SPEED DYNAMOS WITH PARALLEL-CONNECTED STORAGE BATTERIES. Akt. Ges. Brown, Boveri et Cie. November 11th, 1916. (111,477.)